# Operation Guide

Models 437101/437102/437103/437104/
437106/437112/437118/437124

# µR20000 Recorder

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YOKOGAWA
Yokogawa Electric Corporation

IM 04P02B01-02E
3rd Edition

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PRS 108-02E

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**For detailed explanation of functions and the operating procedures of the recorder, see the *μR20000 Recorder User's Manual* (IM 04P02B01-01E) on the CD-ROM.**

Thank you for purchasing the YOKOGAWA µR20000 Recorder. This manual describes concisely the operating procedures of the µR20000 Recorder. To ensure correct use, please read this manual thoroughly before beginning operation.
The following two manuals, in addition to this one, are provided as manuals for the µR20000 Recorder. Please read all of them.

**Electronic Manuals Provided on the Accompanying CD-ROM**

| Manual Title | Manual No. |
|---|---|
| **µR20000 Recorder User's Manual**<br>Explains all the functions and procedures of the recorder excluding the communication functions. | **IM 04P02B01-01E** |
| **µR10000/µR20000 Communication Interface User's Manual**<br>Explains the communication functions using Ethernet interface and the RS-422A/485 communication interface. | **IM 04P01B01-17E** |

**Opening the Electronic Manuals**

The PDF files of the manuals are provided on the accompanying CD-ROM. When the CD-ROM is inserted in the PC's CD-ROM drive, a list of manuals on the CD-ROM is displayed. Click a manual title to open the manual.
If the list of manuals is not displayed automatically, open the manual in the My Computer > 4361_4371_manual > English directory.

## Notes

- The contents of this manual are subject to change without prior notice as a result of continuing improvements to the instrument's performance and functions.
- Every effort has been made in the preparation of this manual to ensure the accuracy of its contents. However, should you have any questions or find any errors, please contact your nearest YOKOGAWA dealer as listed on the back cover of this manual.
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## Revisions

| | |
|---|---|
| 1st Edition | August 2005 |
| 2nd Edition | September 2006 |
| 3rd Edition | April 2011 |

## Safety Precautions

The general safety precautions described here must be observed during all phases of operation.

- **Safety Standards and EMC Standards**
  This recorder conforms to IEC safety class I (provided with terminal for protective grounding), Installation Category II, Measurement category II (CAT II), and EN61326-1 (EMC standard), class A (use in a commercial, industrial, or business environment).
  This recorder is designed for indoor use.
- **About This Manual**
  - This manual should be read by the end user.
  - Read this manual thoroughly and have a clear understanding of the product before operation.
  - This manual explains the functions of the product. YOKOGAWA does not guarantee that the product will suit a particular purpose of the user.
  - Under absolutely no circumstances may the contents of this manual be transcribed or copied, in part or in whole, without permission.
  - The contents of this manual are subject to change without prior notice.
  - Every effort has been made in the preparation of this manual to ensure the accuracy of its contents. However, should you have any questions or find any errors or omissions, please contact your nearest YOKOGAWA dealer.
- **Precautions Related to the Protection, Safety, and Alteration of the Product**
  - The following safety symbols are used on the product and in this manual.

**"Handle with care." To avoid injury and damage to the instrument, the operator must refer to the explanation in the manual.**

**Protective ground terminal**

**AC**

**DC**

**"High temperature." To avoid injury caused by hot surface, do not touch locations where this symbol appears.**

  - For the protection and safe use of the product and the system controlled by it, be sure to follow the instructions and precautions on safety that are stated in this manual whenever you handle the product. Take special note that if you handle the product in a manner that violate these instructions, the protection functionality of the product may be damaged or impaired. In such cases, YOKOGAWA does not guarantee the quality, performance, function, and safety of the product.
  - When installing protection and/or safety circuits such as lightning protection devices and equipment for the product and control system or designing or installing separate protection and/or safety circuits for fool-proof design and fail-safe design of the processes and lines that use the product and the control system, the user should implement these using additional devices and equipment.
  - If you are replacing parts or consumable items of the product, make sure to use parts specified by YOKOGAWA.
  - This product is not designed or manufactured to be used in critical applications that directly affect or threaten human lives. Such applications include nuclear power equipment, devices using radioactivity, railway facilities, aviation equipment, air navigation facilities, aviation facilities, and medical equipment. If so used, it is the user's responsibility to include in the system additional equipment and devices that ensure personnel safety.
  - Do not modify this product.

3rd Edition: April 2011 (YK)
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**WARNING**

- **Use the Correct Power Supply**
  Ensure that the source voltage matches the voltage of the power supply before turning ON the power.
- **Protective Grounding**
  Make sure to connect the protective grounding to prevent electric shock before turning ON the power.
- **Necessity of Protective Grounding**
  Never cut off the internal or external protective earth wire or disconnect the wiring of the protective earth terminal. Doing so invalidates the protective functions of the instrument and poses a potential shock hazard.
- **Defect of Protective Grounding**
  Do not operate the instrument if the protective earth or fuse might be defective. Make sure to check them before operation.
- **Do Not Operate in an Explosive Atmosphere**
  Do not operate the instrument in the presence of flammable liquids or vapors. Operation in such environments constitutes a safety hazard.
- **Do Not Remove Covers**
  The cover should be removed by YOKOGAWA's qualified personnel only. Opening the cover is dangerous, because some areas inside the instrument have high voltages.
- **External Connection**
  Connect the protective grounding before connecting to the item under measurement or to an external control unit.
- **Damage to the Protective Structure**
  Operating the recorder in a manner not described in this manual may damage its protective structure.

**Portable Type (/H5x Option)**

- **Use the Correct Power Supply**
  Ensure that the power supply is within the maximum rated voltage range of the provided power cord before connecting the power cord.
- **Use the Correct Power Cord and Plug**
  To prevent electric shock or fire, be sure to use the power cord supplied by YOKOGAWA. The main power plug must be plugged into an outlet with a protective earth terminal. Do not disable this protection by using an extension cord without protective earth grounding. The power cord is designed for use with this instrument. Do not use the power cord with other instruments.
- **Connect the Protective Grounding Terminal**
  The power cord for the µR20000 is a three-prong type power cord. Connect the power cord to a properly grounded three-prong outlet.

**CAUTION**

This instrument is a Class A product. Operation of this instrument in a residential area may cause radio interference, in which case the user is required to take appropriate measures to correct the interference.

- **Exemption from Responsibility**
  - YOKOGAWA makes no warranties regarding the product except those stated in the WARRANTY that is provided separately.
  - YOKOGAWA assumes no liability to any party for any loss or damage, direct or indirect, caused by the user or any unpredictable defect of the product.
- **Handling Precautions of the Software**
  - YOKOGAWA makes no warranties regarding the software accompanying this product except those stated in the WARRANTY that is provided separately.
  - Use the software on a single PC.
  - You must purchase another copy of the software, if you are to use the software on another PC.
  - Copying the software for any purposes other than backup is strictly prohibited.
  - Please store the original media containing the software in a safe place.
  - Reverse engineering, such as decompiling of the software, is strictly prohibited.
  - No portion of the software supplied by YOKOGAWA may be transferred, exchanged, sublet, or leased for use by any third party without prior permission by YOKOGAWA.

## Handling Precautions

- Use care when cleaning the recorder, especially any plastic parts. When cleaning, wipe using a dry soft cloth. Do not use chemicals such as benzene or thinner, since these may cause discoloring and deformation.
- Keep electrically charged objects away from the signal terminals. This may damage the recorder.
- Do not apply volatile chemicals to the door glass, display, panel keys, etc. Do not allow rubber and vinyl products to remain in contact with the recorder for long periods of time. This may damage the recorder.
- When not in use, make sure to turn OFF the power switch.
- If there are any symptoms of trouble such as strange odors or smoke coming from the recorder, immediately turn OFF the power switch and the power supply source. Then, contact your nearest YOKOGAWA dealer.

## How to Use This Manual

This manual covers information regarding the recorders with English as the display/printing language (suffix code "2").
The following markings are used in this manual.

*Improper handling or use can lead to injury to the user or damage to the instrument.* This symbol appears on the instrument to indicate that the user must refer to the user's manual for special instructions. The same symbol appears in the corresponding place in the user's manual to identify those instructions. In the manual, the symbol is used in conjunction with the word "WARNING" or "CAUTION."

**WARNING**

Calls attention to actions or conditions that could cause serious or fatal injury to the user, and precautions that can be taken to prevent such occurrences.

**CAUTION**

Calls attentions to actions or conditions that could cause light injury to the user or damage to the instrument or user's data, and precautions that can be taken to prevent such occurrences.

***Note***

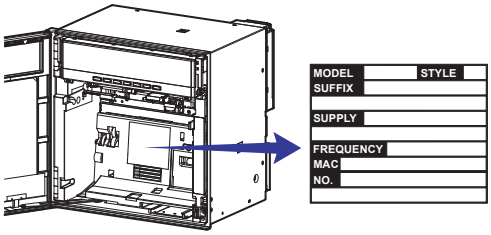
Calls attention to information that is important for proper operation of the instrument.

## Checking the Contents of the Package

Unpack the box and check the contents before operating the instrument. If some of the contents are not correct or missing or if there is physical damage, contact the dealer from which you purchased them.

**µR20000 Recorder**

A name plate is affixed to the case. Check that the model name and suffix code given on the name plate on the rear panel match those on your order.




**NO. (Instrument Number)**

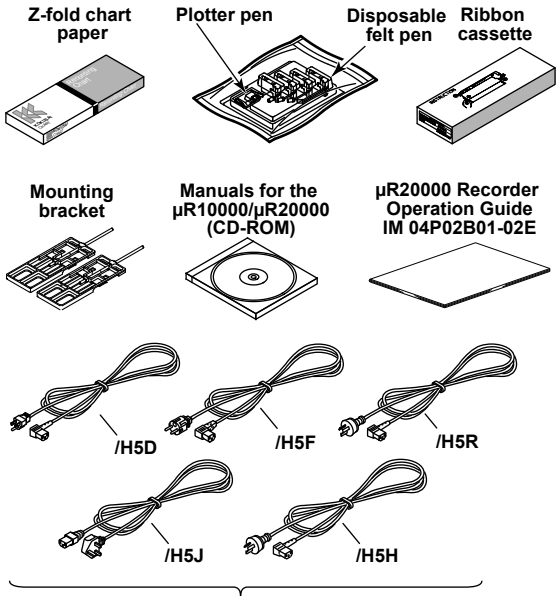
When contacting the dealer from which you purchased the instrument, please give them the instrument number.

**MODEL and SUFFIX Code**

| Model | Suffix Code | Optional Code | Description |
|---|---|---|---|
| 437101 | | | µR20000 1 pen recorder |
| 437102 | | | µR20000 2 pen recorder |
| 437103 | | | µR20000 3 pen recorder |
| 437104 | | | µR20000 4 pen recorder |
| 437106 | | | µR20000 6 dot recorder |
| 437112 | | | µR20000 12 dot recorder |
| 437118 | | | µR20000 18 dot recorder |
| 437124 | | | µR20000 24 dot recorder |
| | -2 | | English/German/French & deg F/DST |
| | | /A1 | Alarm output relay 2 points [1] |
| | | /A2 | Alarm output relay 4 points [1] |
| | | /A3 | Alarm output relay 6 points [1] |
| | | /A4 | Alarm output relay 12 points [1, 2] |
| | | /A5 | Alarm output relay 24 points [1, 2] |
| | | /C3 | RS-422A/485 interface [3] |
| | | /C7 | Ethernet (10BASE-T) interface [3] |
| | | /F1 | Fail/Chart end detection and output [2] |
| | | /H2 | Clamped input terminal [4] |
| | | /H3 | Non-glare door glass |
| | | /H5D | Portable type Power cord UL, CSA st'd [7] |
| | | /H5F | Portable type Power cord VDE st'd [7] |
| | | /H5R | Portable type Power cord AS st'd [7] |
| | | /H5J | Portable type Power cord BS st'd [7] |
| | | /H5H | Portable type Power cord GB st'd [7] |
| | | /M1 | Mathematical function |
| | | /N1 | Cu10, Cu25 RTD input |
| | | /N2 | 3 legs isolated RTD [4, 5] |
| | | /N3 | Expansion inputs [6] |
| | | /P1 | 24 VDC/AC power supply [7] |
| | | /R1 | Remote control 5 points |
| | | /CC1 | Calibration Correction |
| | | /BT1 | Header printout |

1 /A1, /A2, /A3, /A4, and /A5 cannot be specified simultaneously. /A5 is valid on the dot models.
2 /A5 and /F1 cannot be specified simultaneously on the dot models.
/A4 and /F1 cannot be specified simultaneously on the pen models.
3 /C3 and /C7 cannot be specified simultaneously.
4 /H2 and /N2 cannot be specified simultaneously.
5 Valid only on the dot models.
6 14 types of input including Pt50 RTD, PR40-20, and Platinel TC.
7 /H5x and /P1 cannot be specified simultaneously.

**Standard Accessories**




**One of these power cord types is supplied according to the instrument's suffix code**

| Part Number | Note |
|---|---|
| A1006WD | Provided when optional code /H5D is specified. Maximum rated power voltage: 125 V |
| A1009WD | Provided when optional code /H5F is specified. Maximum rated power voltage: 250 V |
| A1024WD | Provided when optional code /H5R is specified. Maximum rated power voltage: 250 V |
| A1023WD | Provided when optional code /H5J is specified. Maximum rated power voltage: 250 V |
| A1064WD | Provided when optional code /H5H is specified. Maximum rated power voltage: 250 V |

| Item | | 1-Pen | 2-Pen | 3-Pen | 4-Pen | Dot |
|---|---|---|---|---|---|---|
| Z-fold chart paper | | 1 | 1 | 1 | 1 | 1 |
| Ribbon cassette | | - | - | - | - | 1 |
| Disposable felt pen | Red | 1 | 1 | 1 | 1 | - |
| | Green | - | 1 | 1 | 1 | - |
| | Blue | - | - | 1 | 1 | - |
| | Violet | - | - | - | 1 | - |
| Plotter pen | Purple | 1 | 1 | 1 | 1 | - |
| Mounting bracket (included with models without /H5x) | | 2 | 2 | 2 | 2 | 2 |
| Power cord (included with /H5x) | | 1 | 1 | 1 | 1 | 1 |
| Manuals for the µR10000/ µR20000 (CD-ROM) | | 1 | 1 | 1 | 1 | 1 |
| µR20000 Recorder Operation Guide IM 04P02B01-02E | | 1 | 1 | 1 | 1 | 1 |

**Software (Sold Separately, see page 8)**

| Item | Model | Note |
|---|---|---|
| Configuration software | RXA10-01 | |
| | RXA10-02 | With interface unit* |

* You can use the Configuration Software if you install the interface unit to a recorder does not include the communication function.

**Optional Accessories (Sold Separately)**

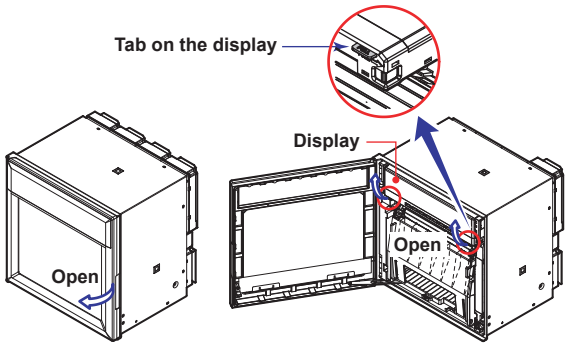
The optional accessories below are available for purchase separately. If you make an order, make sure that all contents are present and undamaged.

For information about ordering accessories, contact the dealer from which you purchased the recorder.

| Item | | Model | Quantity | Note |
|---|---|---|---|---|
| Z-fold chart paper | | B9573AN | 1 | 10 pieces. |
| Ribbon cassette | | B9906JA | 1 | |
| Disposable felt pen | Red | B9902AM | 1 | 3 pieces. |
| | Green | B9902AN | 1 | 3 pieces. |
| | Blue | B9902AP | 1 | 3 pieces. |
| | Violet | B9902AQ | 1 | 3 pieces. |
| Plotter pen | Purple | B9902AR | 1 | 3 pieces. |
| Mounting bracket | | B9900BX | 2 | |
| Shunt resistor for the screw terminal (standard) | | 415920 | 1 | 250 Ω ±0.1% |
| | | 415921 | 1 | 100 Ω ±0.1% |
| | | 415922 | 1 | 10 Ω ±0.1% |
| Shunt resistor for the clamped input terminal (/H2) | | 438920 | 1 | 250 Ω ±0.1% |
| | | 438921 | 1 | 100 Ω ±0.1% |
| | | 438922 | 1 | 10 Ω ±0.1% |

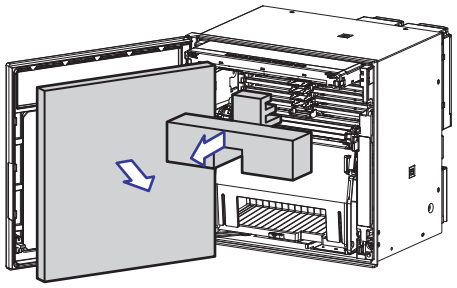
## Removing the Packing Materials

Open the door, hold the left and right tabs and pull the display and key panel section toward you. The section opens upward.

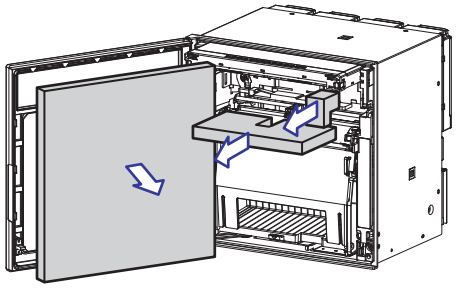



Remove all packing materials.

- **Pen Model**



- **Dot Model**



## Recorder's Version and Functions Described in This Manual

The contents of this manual corresponds to the recorder with version 1.31.

### µR20000 Versions and Functions

| Version | Suffix Code | Added or Modified Functions | Reference |
|---|---|---|---|
| 1.11 or earlier | – | – | – |
| 1.21 | -2 | (Added) Language support (German and French) | Sec. 1.9 in the User's Manual (IM 04P02B01-01E) |
| | /CC1 | (Added) Calibration Correction | Sec. 1.2 in the User's Manual (IM 04P02B01-01E) |
| | /H5x | (Added) Portable type | Page 20 and 14 in this manual |
| | /P1 | (Added) 24 VDC/AC power supply operation | Page 20 and 21 in this manual |
| 1.31 | – | (Added) Customized menu | Sec. 1.9 in the User's Manual (IM 04P02B01-01E) |
| | – | (Added) Modbus register (40301 to 40348) | Communication manual |
| | /BT1 | (Added) Header printout | Sec. 1.4 in the User's Manual (IM 04P02B01-01E) |

- Checking the Version Number
  You can check the version number on the System display.
  The System display cannot be shown at the factory default condition.
  First, register the System display to the display screen.
  - Procedure of registering the System display to the display screen: See Changing the Display Information on Page 48.
  - Procedure of displaying the System display: The screen switches each time the **DISP** key is pressed. Press the **DISP** key repeatedly until System display is shown. The displayed contents on the System display switches every 3 seconds. Check the number shown by the "Version:" item.

## Software (Sold Separately)

The table below shows the relationship between the RXA10 Configuration Software revisions and the µR20000 recorder versions.

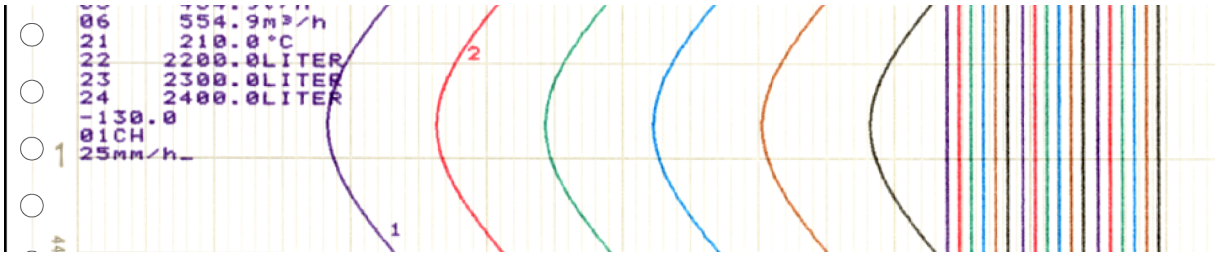
| | | Recorder version | | |
|---|---|---|---|---|
| | | 1.11 or earlier | 1.21 | 1.31 |
| **RXA10 Configuration Software revision** | R2.01 | Yes | Yes | Limited |
| | R3.01 | Yes | Yes | Yes |

Yes: Compatible
Limited: The new functions of the recorder cannot be configured from the RXA10.

# Function Introduction/Names of Parts

## Function Introduction

The µR20000 Recorder (hereafter referred to as the recorder) can be used to assign DC voltage, 1-5V, thermocouple, RTD, and contact or voltage ON/OFF signal to channels for measurement. The measured results are recorded with pens or dots on a chart paper that is fed at a constant speed. The pen model can record up to 4 channels; the dot model can record up to 24 channels.




### Alarms

For each channel, various alarms such as high limit alarm and low limit alarm can be assigned to monitor the measured values. Alarm output relays can be used to output contact signals when alarms occur (/A1, /A2, /A3, /A4 and /A5 options).

### Recording

The measured results are recorded with pens or dots on a chart paper (trend recording). The chart speed can be selected from 5 to 12000 mm/h on the pen model and 1 to 1500 mm/h on the dot model.
In addition to trend recording, various types of information can be printed on the chart paper such as numeric measured values, alarm occurrence/release, and predefined messages.
Also, the recorder settings can be printed.

### Internal Light

A light is provided for easier viewing of the recording area of the chart paper.

### Display

Measured values can be displayed numerically or using bar graphs on the large display. Also, alarm status and chart speed can be displayed.

### Communication Functions

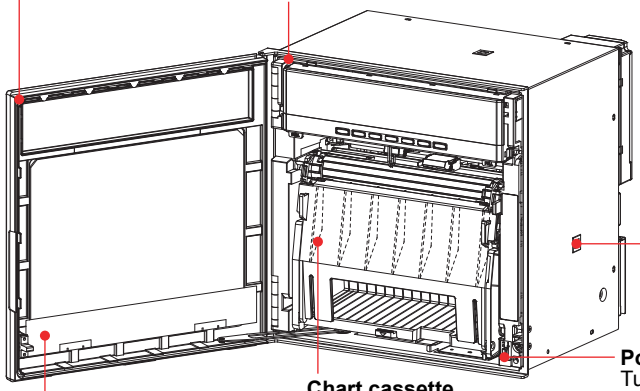
Using the Ethernet communication interface (/C7 option) or the RS-422A/485 communication interface (/C3 option), the measured values on the recorder can be output to a computer or a computer can be used to control the recorder.
For details on communication functions, see the *µR10000 /µR20000 Communication Interface User's Manual* (IM 04P01B01-17E) on the CD-ROM.

### Other Main Functions

The computation function (/M1 option) can be used to perform various computations from four arithmetic operations to statistical calculations on 8 and 24 computation channels on the pen model and dot model, respectively. The computed results can be recorded.
The remote control function (/R1 option) can be used to control the recording start/stop and other operations of the recorder by applying contact signals to the dedicated terminals.
The FAIL/chart end detection and output function (/F1 option) can be used to output contact signals when errors are detected on the recorder or when the chart paper runs out.

# Names of Parts

## Front



**Door**

**Display and key panel**
Hold the left and right tabs and pull to open.

**Mounting hole**
There is one hole on each of the top, bottom, left, and right panels.
The hole is covered with a seal.

**Power switch**
Turns ON/OFF the power each time the switch is pressed.

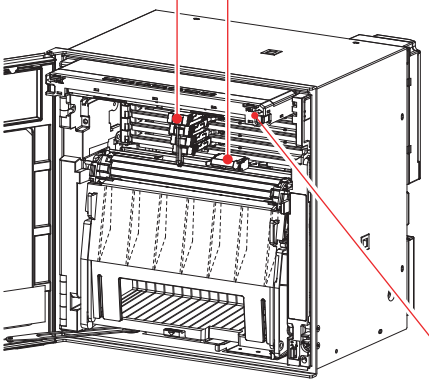
**Chart cassette**
Holds the chart paper.

**Tag plate**
Used to write channel names.

**Pen model**

**Recording pen**
Records the measured value.

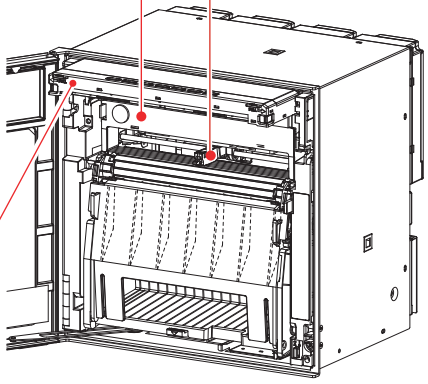
**Plotter pen**
Prints various types of information.



**Dot model**

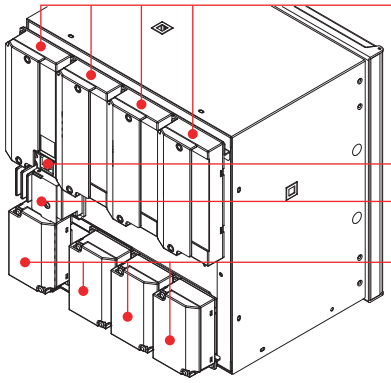
**Ribbon cassette**
Six-color ink.

**Printer carriage**
Records measured values and prints various types of information.



**Display and key panel (see the next page)**
There are internal lights on the bottom section of the display and key panel. They lights up the recording area of the chart paper.

## Rear Panel



**Optional terminal block**
This is where terminals or ports used by options such as alarm output relays and communication interface are installed.

**Ethernet port (/C7 option)**

**Power terminal block**
The power terminal and protective ground terminal.

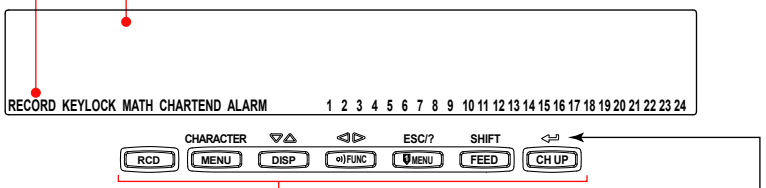
**Measuring input terminal block**
Measuring input terminals

The portable type (/H5x option) comes with a handle, feet, and dedicated power supply connector.

## Display and Key Panel

**Status display**
Displays the following information.
**RECORD.....** Illuminates while recording measured values.
**KEY LOCK.....** Illuminates when key lock is enabled.
**MATH.....** Illuminates when computation on the computation function (/M1 option) is in progress.
**CHART END.....** Illuminates when the chart paper is out (/F1 option).
**ALARM 1 to 24..** Illuminates when an alarm is occurring on channels 1 to 24.

**Main display**
Displays the measured values. Also, displays the setup screen when setting functions.




**Seven keys are available.**
For all keys except RCD, functions marked above the keys are enabled when setting functions or when the FUNC key or the DISP MENU key is pressed.

**<While setting functions, when the FUNC key/DISP MENU key is pressed>**

**CHARACTER Key: Changes the character type when entering a character. Press this key while holding down the SHIFT key to switch the character type in reverse order.**

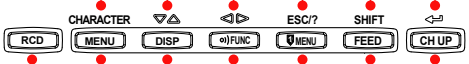
**UP/DOWN Key: Switches the setup item or the value. Press this key while holding down the SHIFT key to switch the setup item or the value in reverse order.**

**LEFT/RIGHT Key: Moves the cursor to the right when entering a value or character. Press this key while holding down the SHIFT key to move the cursor to the left..**

**ESC Key: Cancels the operation. When pressed with the SHIFT key, the display of the comment on the setting turns ON/OFF.**

**SHIFT Key: Used with the ▽△ key, ◁ ▷ key, or the CHARACTER key.**

**ENTER Key: Confirms the setup item or value.**




**<During normal operation>**

**CH UP key**
**Switches the displayed channel.**
**(when manual switching is specified)**

**FEED key**
**Feeds the chart paper.**

**DISP MENU key**
**Hold this key down for 3 seconds to switch to the data display setup screen. Hold this key down for 3 seconds also to exit from the data display setup screen.**

**FUNC key**
**Used when executing manual printout, message printout, etc.**

**DISP key**
**Switches the screen in the main display.**

**MENU key**
**Hold this key down for 3 seconds to enter Setting mode. Hold this key down for 3 seconds also to exit from Setting mode.**

**RCD key**
**Starts/stops recording.**

# Installing/Wiring the Recorder

## Installation Location

Install the recorder indoors in a location that meets the following conditions.

- **Instrument Panel**
  The recorder is designed for panel mounting. The portable type (/H5x option) is designed to be used on the desktop.
- **Well-Ventilated Location**
  To prevent overheating, install the recorder in a well-ventilated location.
  For the panel cut dimensions when arranging multiple recorders, see page 14. Follow the panel cut dimensions providing adequate space between instruments when other instruments are arranged on the panel.
  We recommend that you secure at least 50 mm of space from the left, right, top, and rear panels on the portable type (/H5x option).
- **Minimum Mechanical Vibrations**
  Choose an installation location with the minimum mechanical vibration.
  Installing the recorder in a location with large mechanical vibration not only causes adverse effects on the mechanism but also may hinder normal recording.
- **Horizontal**
  Install the recorder horizontally (However, the recorder can be inclined up to 30 degrees backwards for panel mounting).

***Note***

- Condensation may occur if the recorder is moved to another place where both the ambient temperature and humidity are higher, or if the temperature changes rapidly. In addition, measurement errors will result when using thermocouples. In this case, let the recorder adjust to the new environment for at least one hour before using it.
- The chart paper may be adversely affected by a rapid change in the ambient temperature and humidity.

Do not install the recorder in the following places.

- **Outdoors**
- **In Direct Sunlight or Near Heat Sources**
  Install the recorder in a place with small temperature fluctuations near room temperature (23°C). Placing the recorder in direct sunlight or near heat appliances can cause adverse effects on the internal circuitry.
- **Where an Excessive Amount of Soot, Steam, Moisture, Dust, or Corrosive Gases Are Present**
  Soot, steam, moisture, dust, and corrosive gases will adversely affect the recorder. Avoid such locations.
- **Near Strong Magnetic Field Sources**
  Do not bring magnets or instruments that produce electromagnetic fields close to the recorder. Operating the recorder in strong magnetic fields can cause errors in the measurements.

## Installation Procedure

The recorder should be mounted on a steel panel of thickness 2 mm to 26 mm.

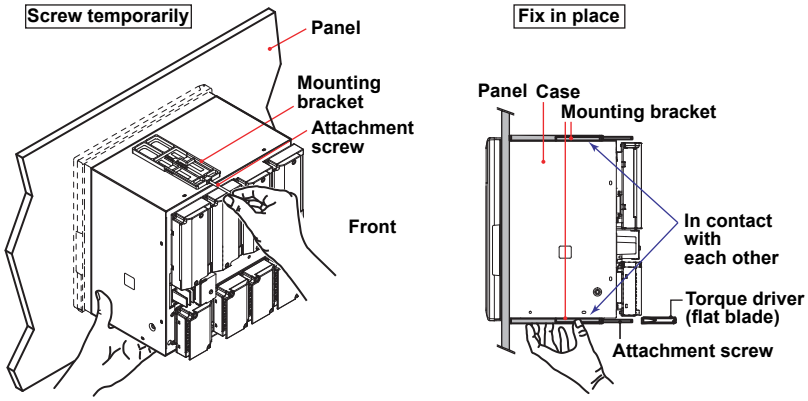
1. Insert the recorder from the front side of the panel (see the mounting diagram on the next page).
2. Mount the recorder to the panel using the mounting brackets that come with the package.
   - Use two brackets to support the top and bottom or the left and right sides of the case (remove the seal that is covering the holes for the mounting brackets beforehand).
   - The proper torque for tightening the mounting screws is 0.7 to 0.9 N•m.

- Mount the recorder to the panel according to the procedure below.
  - First, attach the two mounting brackets and temporarily fasten the attachment screws.
  - Next, fix the recorder in place by tightening the attachment screws with the appropriate torque. When the recorder is approximately perpendicular to the panel as you fasten the screws, press the mounting bracket against the case so that they are in contact with each other.

**CAUTION**

Tightening the screws too much can deform the case or damage the bracket.

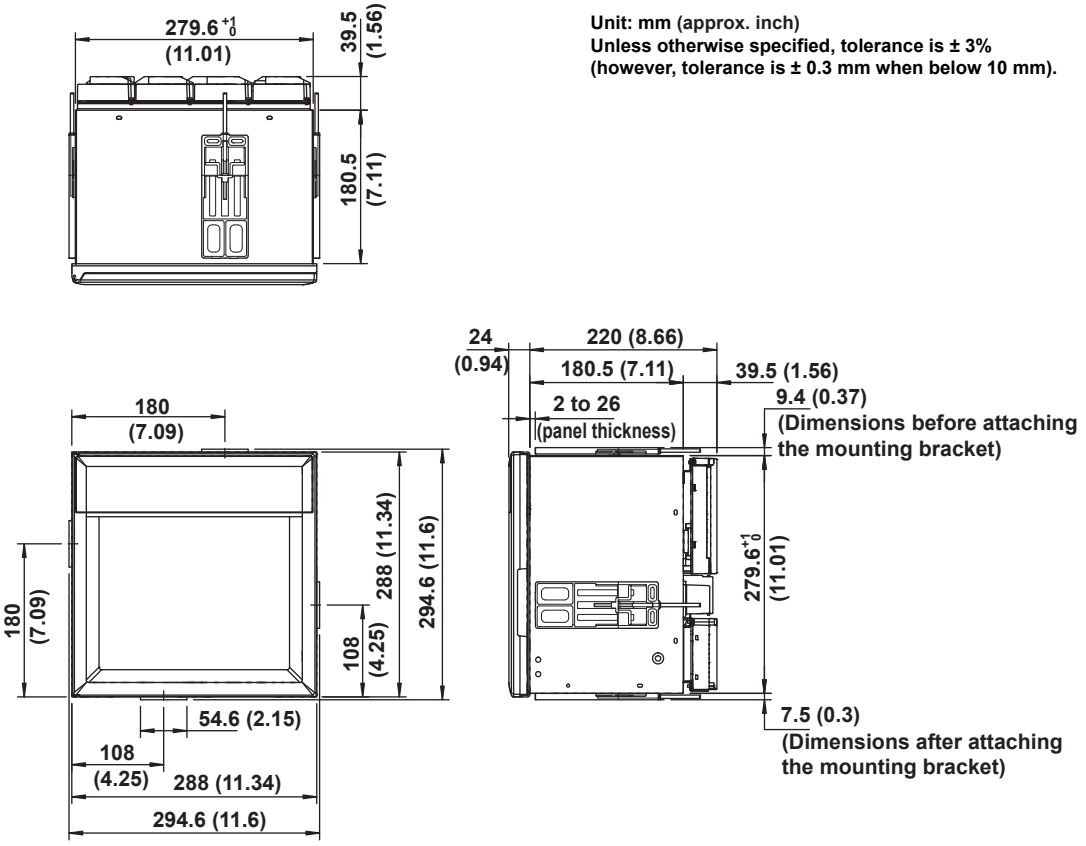
## Panel Mounting Diagram



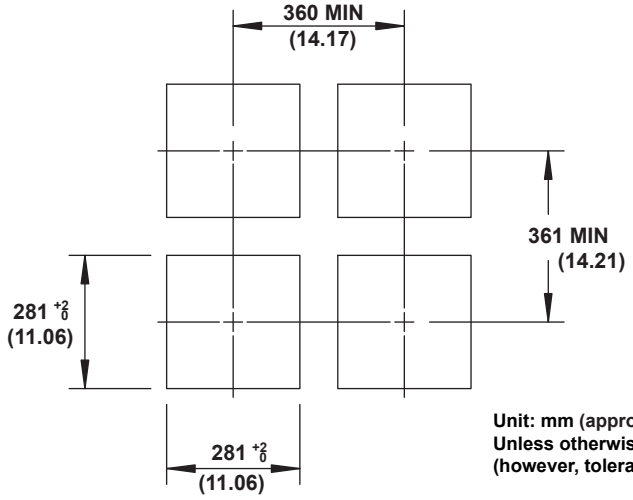

(The figure shows the case when the mounting brackets are used on the top and bottom of the case.)

## External Dimensions

Unit: mm (approx. inch)
Unless otherwise specified, tolerance is ± 3%
(however, tolerance is ± 0.3 mm when below 10 mm).

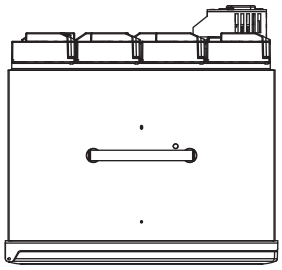


## Panel Cutout

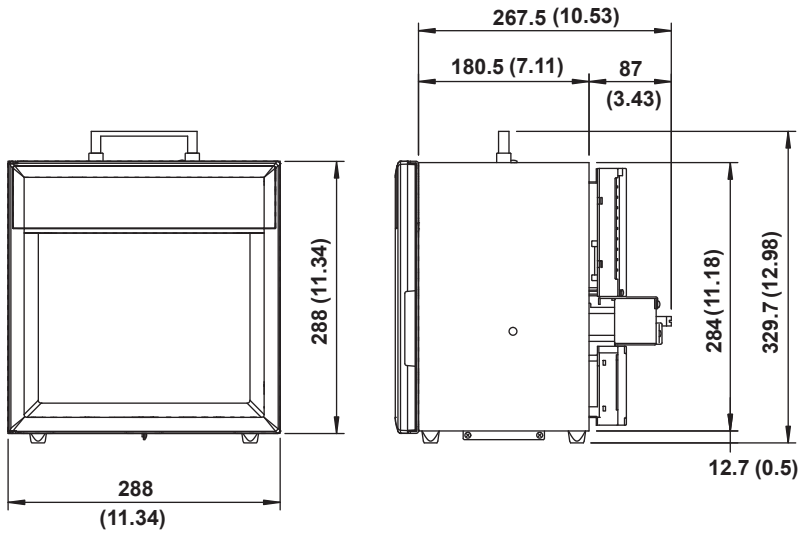



**Unit: mm** (approx. inch)
**Unless otherwise specified, tolerance is ± 3%**
**(however, tolerance is ± 0.3 mm when below 10 mm).**

## External Dimensions of the Portable Type (/H5x Option)



**Unit: mm** (approx. inch)
**Unless otherwise specified, tolerance is ± 3%**
**(however, tolerance is ± 0.3 mm when below 10 mm).**



## Input Signal Wiring

**WARNING**

- To prevent electric shock while wiring, ensure that the power supply source is turned OFF.

**CAUTION**

- The input terminals of this instrument are specific to this instrument. Do not connect the input terminals of the µR1000, µR1800 or other models, as malfunction may result.
- If a strong tension is applied to the cable wired to the recorder, the terminals of the recorder and/or the cable can be damaged. In order to prevent tension from being applied directly on the terminals, fasten all wiring cables to the rear of the mounting panel.
- Do not apply a voltage exceeding the following value to the input terminals as this may damage the recorder.
  - Maximum input voltage
    Voltage range less than or equal to 200 mVDC, TC, RTD, and DI: ±10 VDC
    Ranges other than those listed above: ±60 VDC
  - Maximum common-mode voltage
    ±60 VDC (under measurement category II conditions)
- The recorder is an INSTALLATION CATEGORY II product.

### Precautions to Be Taken While Wiring

Take the following precautions when wring the input signal cables.

**It is recommended that crimp-on lug with insulation sleeves (designed for 4-mm screws) be used when connecting the input/output signal wires to the terminals. However, this does not apply clamped terminals (/H2).**

**Crimp-on lug with insulation sleeves (for 4-mm screws)**

### For clamped terminals (/H2), the following wire is recommended.

- Conductive cross-sectional area for single wire: 0.14 $mm^2$ to 1.5 $mm^2$, stranded wire: 0.14 $mm^2$ to 1.0 $mm^2$
- Length of the stripped section of the wire: Approx. 5 mm

### Take measures to prevent noise from entering the measurement circuit.

- Move the measurement circuit away from the power cable (power circuit) and ground circuit.
- It is desirable that the object being measured does not generate noise. However, if this is unavoidable, isolate the measurement circuit from the object. Also, ground the object being measured.
- Shielded wires should be used to minimize noise caused by electrostatic induction. Connect the shield to the ground terminal of the recorder as necessary (make sure you are not grounding at two points).
- To minimize noise caused by electromagnetic induction, twist the measurement circuit wires at short, equal intervals.
- Make sure to earth ground the protective ground terminal through minimum resistance (less than 100 Ω).

### When using internal reference junction compensation on the thermocouple input, take measures to stabilize the temperature at the input terminal.

- Always use the terminal cover.
- Do not use thick wires which may cause large heat dissipation (cross sectional area of 0.5 $mm^2$ or less recommended).
- Make sure that the ambient temperature remains reasonably stable. Large temperature fluctuations can occur if a nearby fan turns ON or OFF.

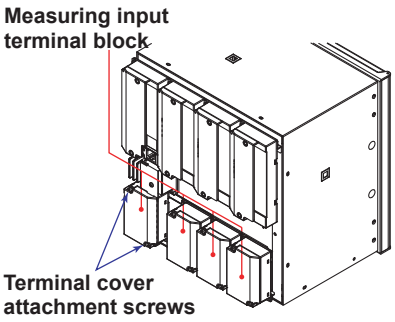
### Connecting the input wires in parallel with other devices can cause signal degradation, affecting all connected devices.

If you need to make a parallel connection, then

- Turn the burnout detection function OFF.
- Ground the instruments to the same point.
- Do not turn ON or OFF another instrument during operation. This can have adverse effects on the other instruments.
- RTDs cannot be wired in parallel.

## Wiring Procedure

A terminal cover is screwed in place on the measuring input terminal block on the rear panel. A label indicating the terminal arrangement is affixed to the cover.



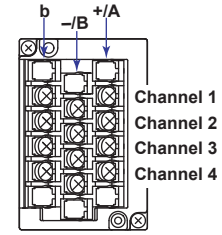

1. Turn OFF the recorder and remove the terminal cover.
2. Connect the signal wires to the terminals.

### *Note*

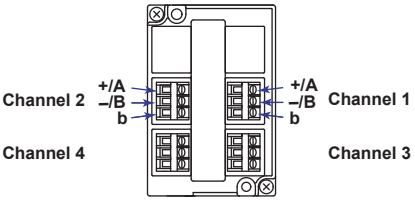
Input signal wires of diameter less than or equal to 0.3 mm may not be secured firmly for clamped terminals (/H2). Fold over the conducting section of the wire, for example, to make sure that the wire is securely connected to the clamped terminal.

3. Replace the terminal cover and fasten it with screws.
   The proper torque for tightening the screws is 0.6 N•m.

**Pen Model**

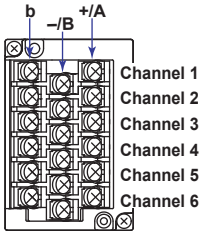



Screw input terminal

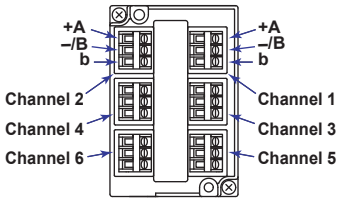



Clamped input terminal (/H2 option)

**Dot Model**

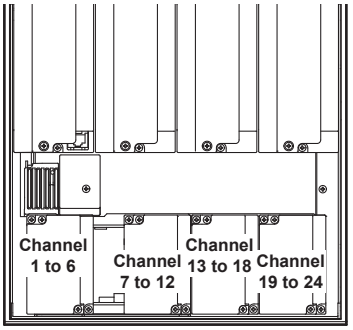



Screw input terminal



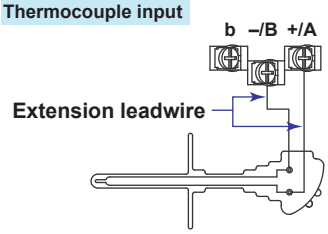

Clamped input terminal (/H2 option)

Channel location on the input terminals



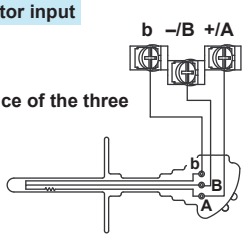

## Measuring Input Wiring

**Thermocouple input**

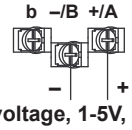



**Resistance temperature detector input**

Leadwire resistance:
10 Ω max./wire. The resistance of the three wires should be equal.



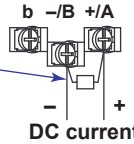

**DC voltage input, 1-5V input, and ON/OFF input**




DC voltage, 1-5V, ON/OFF

**DC current input**

Shunt resistor
Example: For a 4 to 20 mA input, a shunt resistor of 250 Ω ± 0.1% can be used to convert to 1-5V input.




DC current

### *Note*

RTD input terminals A and B on the dot model are isolated on each channel. Terminal b is shorted internally across all channels. However, for 3 legs isolated RTDs (/N2 option), input b is also isolated for each channel.

## Optional Terminal Wiring

**WARNING**

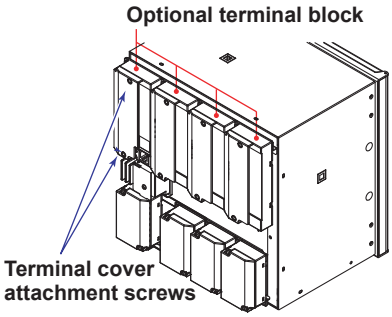
- To prevent electric shock while wiring, ensure that the power supply source is turned OFF.
- If a voltage of more than 30 VAC or 60 VDC is to be applied to the output terminals, use ring-tongue crimp-on lugs with insulation sleeves on all terminals to prevent the wires from slipping out when the screws become loose. Furthermore, use double-insulated wires (dielectric strength of 2300 VAC or more) for the signal wires on which a voltage of more than 30 VAC or 60 VDC is to be applied. For all other wires, use basic insulated wires (dielectric strength of 1390 VAC). To prevent electric shock, attach the terminal cover after wiring and make sure not to touch the terminals.

**CAUTION**

- The option terminals of this instrument are specific to this instrument. Do not connect the option terminals of the μR1000, μR1800 or other models, as malfunction may result.
- To prevent fire, use signal wires having a temperature rating of 70°C or more.
- If a strong tension is applied to the cable wired to the recorder, the terminals of the recorder and/or the cable can be damaged. In order to prevent tension from being applied directly on the terminals, fasten all wiring cables to the rear of the mounting panel.

### Wiring Procedure

As shown in the figure below, the optional terminal block is located on the rear panel. The optional terminal block is provided on the recorder when an option that requires input/output is installed such as the alarm output relay (/A1, /A2, /A3, /A4, or /A5 option), FAIL/chart end output (/F1 option), remote control function (/R1 option), RS-422A/485 interface (/C3 option)*, and Ethernet (10BASE-T) interface (/C7 option)*. A terminal cover is screwed in place on the measuring input terminal block. A label indicating the terminal arrangement is affixed to the terminal block.

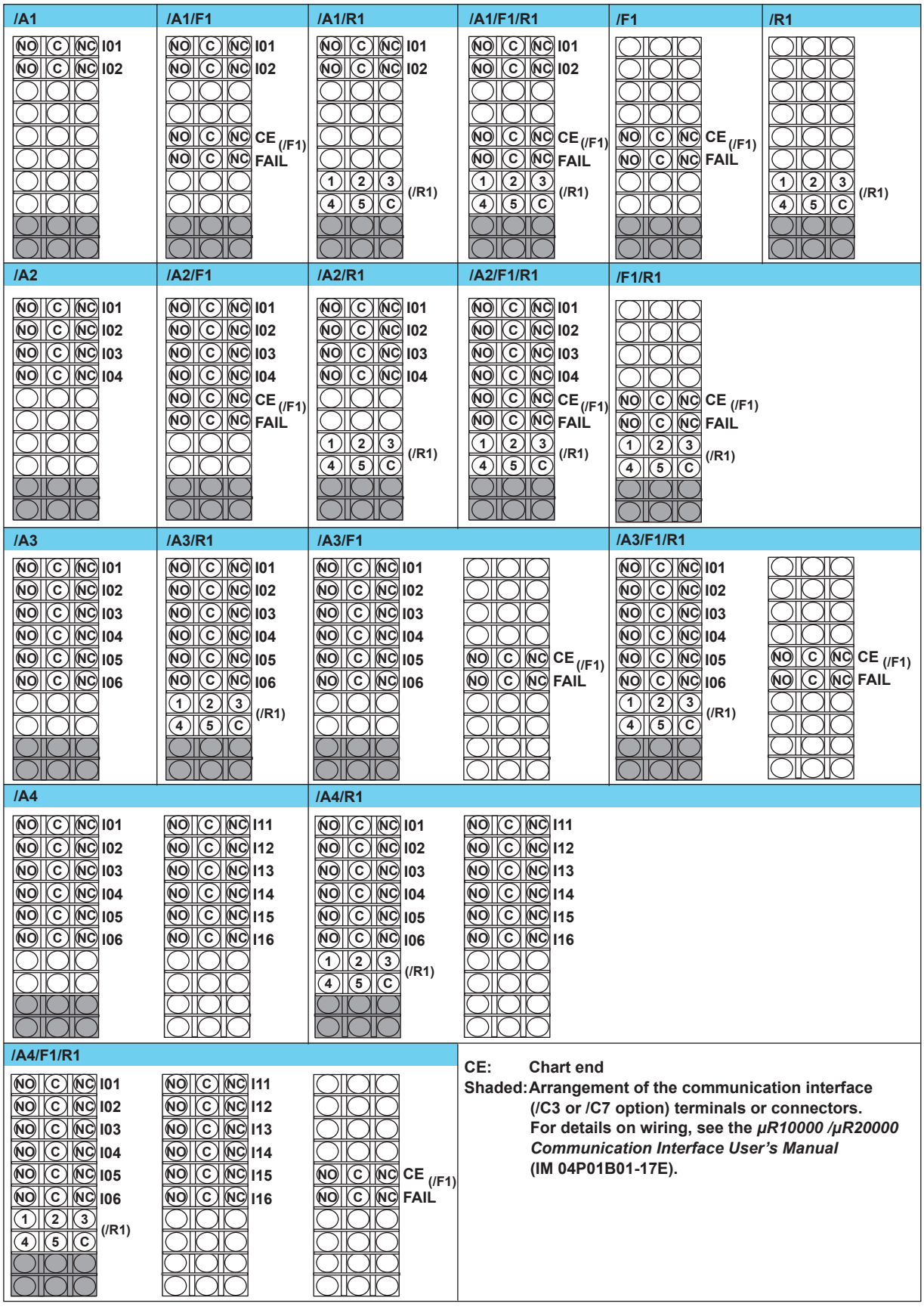



* For details on terminal and connector arrangement and wiring, see the *μR10000 /μR20000 Communication Interface User's Manual* (IM 04P01B01-17E).

1. Turn OFF the recorder and remove the terminal cover.
2. Connect the input signal wires to the terminals.
3. Replace the terminal cover and fasten it with screws.
   The proper torque for tightening the screws is 0.6 N•m.

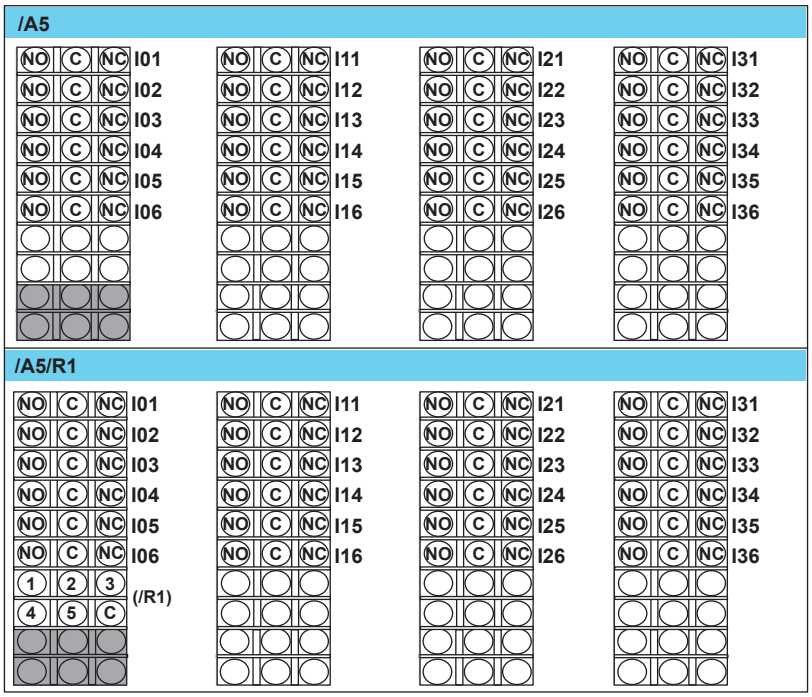
***Note***

To reduce noise, use a shielded cable for the wiring of the remote control input terminals. Connect the shield to the ground terminal of the recorder.




CE: Chart end

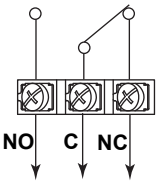
Shaded: Arrangement of the communication interface (/C3 or /C7 option) terminals or connectors. For details on wiring, see the *μR10000 /μR20000 Communication Interface User's Manual* (IM 04P01B01-17E).




**Shaded:** **Arrangement of the communication interface (/C3 or /C7 option) terminals or connectors. For details on wiring, see the *μR10000 /μR20000 Communication Interface User's Manual* (IM 04P01B01-17E).**

## Alarm Output Relay Terminals and FAIL/Chart End Output Relay Terminals

Alarm output terminals are expressed as I01 to I06, I11 to I16, I21 to I26, and I31 to I36 in the alarm output relay settings.



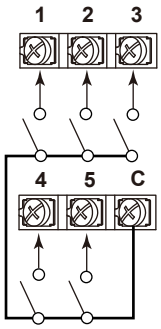

**Output:** Relay contact
**Contact rating:** 250 VAC (50/60 Hz) /3 A, 250 VDC/0.1 A (for resistor load)
**Dielectric strength:** 1500 VAC at 50/60 Hz for one minute
(between output terminals and the ground terminal)

**NO**(Normally Opened), **C**(Common), **NC**(Normally Closed)

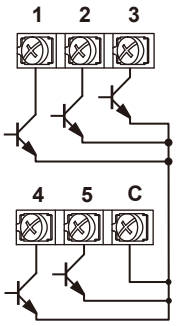
## Remote Control Input Terminals

Remote control input terminals 1 to 5 are expressed as numbers 1 to 5 in the remote control input settings.

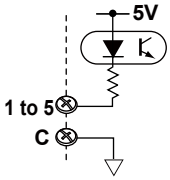
- **Relay contact input (Voltage-free contact)**
  Contact closed at 200 Ω or less
  Contact open at 100 kΩ or greater




- **Transistor input (Open collector)**
  ON voltage: 0.5 V or less (30 mADC)
  Leakage current when turned OFF: 0.25 mA or less




**Internal circuit**




**Input format:**
Photocoupler isolation
Shared common (C)
**Allowable input voltage:**
5 VDC

1 to 5 (Remote control input terminals), C (Common)

**Dielectric strength:** 500 VDC for one minute (between input terminals and the ground terminal)

## Power Supply Wiring

**WARNING**

**Panel Mount Type**

- To prevent electric shock when wiring, ensure the main power supply is turned OFF.
- To prevent the possibility of fire, use 600 V PVC insulated wire (AWG20 to 16) or an equivalent wire for power wiring.
- Make sure to earth ground the protective earth terminal through a grounding resistance less than 100 Ω before turning ON the power.
- Use crimp-on lugs (designed for 4-mm screws) for power and ground wiring termination.
- To prevent electric shock, make sure to close the transparent cover for the power supply wires.
- Make sure to provide a power switch (double-pole type) on the power supply line in order to separate the recorder from the main power supply. Put an indication on this switch as the breaker on the power supply line for the recorder and indications of ON and OFF.
  Switch specifications
  Rated power current: 1 A or more (other than /P1), 3 A or more (/P1 option)
  Rated rush current: 60 A or more (other than /P1), 70 A or more (/P1 option)
  Complies with IEC 60947-1, 3.
- Connect a fuse in the power supply line.
  2 A to 15 A (other than /P1), 4 A to 15 A (/P1 option)
- Do not add a switch or fuse to the ground line.

**Portable Type (/H5x Option)**

- Ensure that the source voltage matches the rated power supply voltage of the instrument before connecting the power cord.
- Connect the power cord after checking that the power switch of the portable type is turned OFF.
- To prevent electric shock or fire, be sure to use the power cord for the portable type supplied by YOKOGAWA.
- Make sure to connect protective earth grounding to prevent electric shock. Connect the power cord of the portable type to a three-prong power outlet equipped with a protective earth terminal.
- Do not use an extension cord that does not have a protective grounding wire. The protective features of the instrument will be rendered ineffective.

Use a power supply that meets the following conditions:

| Item | Power Supply Specifications | |
|---|---|---|
| | (Options Other Than /P1) | (/P1 Option) |
| Rated supply voltage | 100 to 240 VAC | 24V DC/AC |
| Allowable power supply voltage range | 90 to 132/180 to 264 VAC | 21.6 V to 26.4 VDC/AC |
| Rated power supply frequency | 50/60 Hz | 50/60 Hz (for AC) |
| Allowable power supply frequency range | 50/60 Hz ±2% | 50/60 Hz ±2% (for AC) |
| Maximum power consumption | 55 VA | 35 VA (for DC) or 45 VA (for AC) |

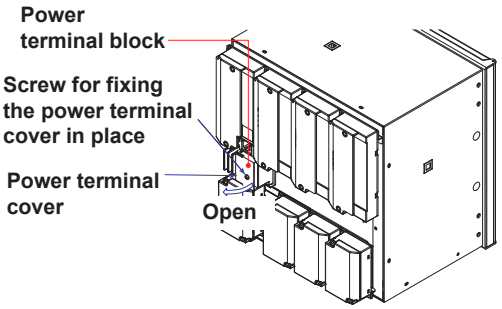
***Note***

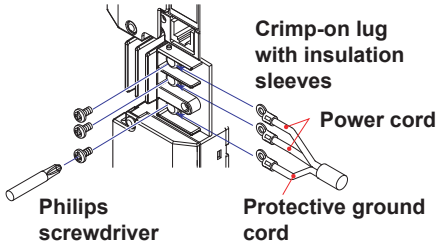
Do not use a supply voltage in the range 132 to 180 VAC, as this may have adverse effects on the measurement accuracy.

## Wiring Procedure (Panel Mount Type)

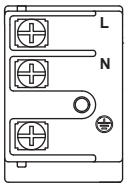
The power supply terminals and protective ground terminals are located on the rear panel.

1. Turn OFF the power switch on the recorder and open the power terminal cover.
2. Wire the power cord and the protective ground cord to the power supply terminals. Use ring-tongue crimp-on lugs (designed for 4-mm screws).
3. Close the power supply terminal cover and secure it with the screw. The proper torque for tightening the screws is 0.6 N•m.

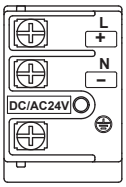



• Other than /P1

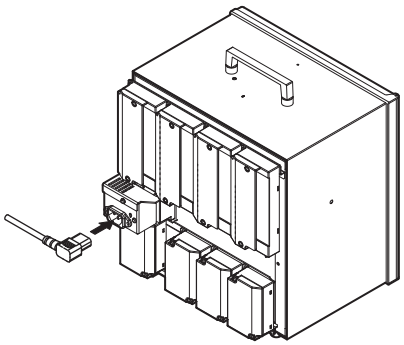



• /P1 (24 VDC/AC power supply)




## Wiring Procedure (Portable Type (/H5x Option))

1. Check that the power switch to the instrument is turned OFF.
2. Connect the plug on the accessory power cord to the power supply connector on the rear panel.



3. Ensure that the power outlet to be used meets the conditions on the previous page and that the voltage of the power supply is within the maximum voltage rating of the power cord, then connect the other end of the power cord to the power supply outlet.
   The AC outlet must be of a three-prong type with a protective earth ground terminal.

## Turning ON/OFF the Power Switch

The power switch is located inside the door at the lower right. The power switch is a push button.

Press once to turn it ON and press again to turn it OFF. When the power switch is turned ON, a self-diagnosis program runs for a few seconds, and the recorder is ready for operation.

# Common Operations and Menu Structure

## Execution Modes

The recorder has three execution modes.

### Operation Mode

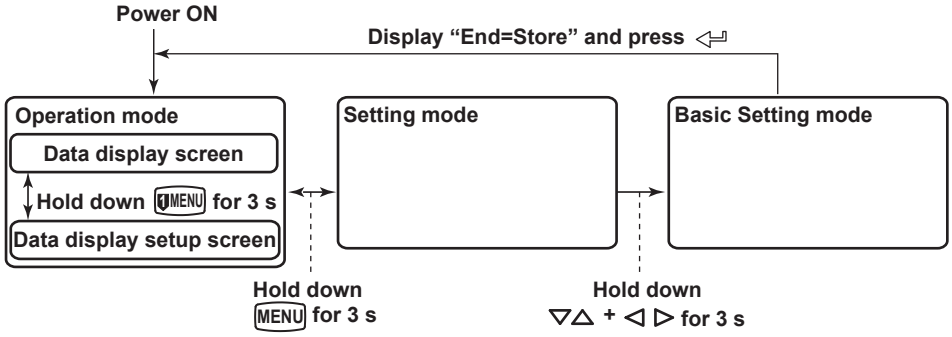
This mode is used for normal recording operation. The recorder enters this mode when the power is turned ON.

### Setting Mode

This mode is used to set the input range, alarms, chart speed, and other parameters. These settings can be changed while recording is in progress. However, the input range of measurement channels and the computing equation, unit, constant, and TLOG setting of computation channels cannot be changed while computation (/M1 option) is in progress.

### Basic Setting mode

This mode is used to set the basic specifications of the recorder such as the thermocouple burnout detection function and the alarm output relay operation. This mode cannot be entered while the recorder is recording or while computation is in progress on the computation function (/M1 option). Measurement, recording, and alarm detection cannot be carried out in this mode.




## Operation Sequence

This section explains the operations that need to be carried out when using the recorder for the first time.

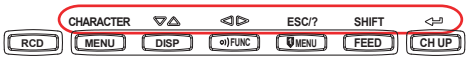
- **Preparing to Record**
  Load the chart paper and pens (pen model) or ribbon cassette (dot model). Change the date/time if necessary.
  For the operating procedure, see page 28.
- **Setting the Channel Input Range and Other Parameters**
  Set the measurement conditions suitable for the object being measured.
  This manual explains the following operations.
  - Setting the input range and alarm (see page 35 for the procedure)
  - Changing the chart speed (see page 44 for the procedure)
- **Recording/Displaying Data**
  Start/Stop the recording operation and carry out various types of printouts. Also, switch the display screen and change the displayed contents.
  For the operating procedure, see page 43.

# Key Operation

## Entering Setting Mode

Hold down the MENU key for 3 seconds.
The Setting mode display appears. The top and bottom lines are the setup item and comment, respectively.
The section that is blinking is the setup item that you change. In this manual, the section that you change appears shaded.

In Setting mode, the panel keys are set to the functions marked above the keys.

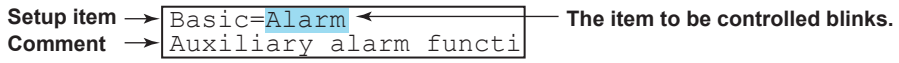



## Exiting from Setting Mode (Returning to Operation Mode)

Hold down the MENU key for 3 seconds.
The recorder returns to operation mode.

## Entering Basic Setting Mode

Hold down the MENU key for 3 seconds to enter Setting mode. Next, hold down both the ▽△ (DISP) key and the ◁ ▷ (FUNC) key for 3 seconds.
The Basic Setting mode display appears. The top and bottom lines are the setup item and comment, respectively.
The section that is blinking in the setup item that you change.




## Exiting from Basic Setting Mode (Returning to Operation Mode)

Press the **ESC** (MENU) key several times to return to the **Basic=** screen.
Press the ▽△ (DISP) key to select **End** and then press the ⏎ (CH UP) key. The setup save screen appears.

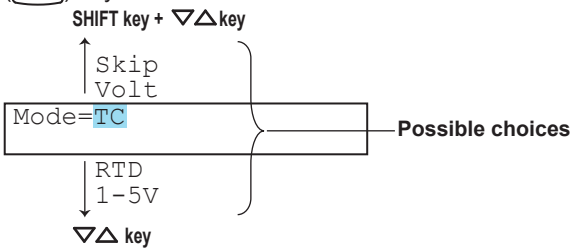
Press the ▽△ (DISP) key to select **Store** and then press the ⏎ (CH UP) key. The setting is applied, and the screen returns to Operation mode. If you select **Abort** and press the ⏎ (CH UP) key, the setting is discarded, and the screen returns to Operation mode.

## Changing the Settings

***Note***

The comment line shows useful information such as a description of the setup item and the range of selectable values. Read the comment and change the items as necessary.

The selected item change each time you press the ▽△ (DISP) key. The selected item change in reverse order if you press the ▽△ (DISP) while holding down the **SHIFT** (FEED) key.




This manual denotes the operation of pressing a key while holding down the **SHIFT** (FEED) key as **SHIFT** + the other key (for example: **SHIFT** + ▽△ key).

After you make a selection, press the ◁┘ (CH UP) key. The next screen appears. When the **Setting complete** screen is displayed, the changed item is applied.

```
01-01 Channel
Setting complete
```

## Using the ESC Key

If you press the **ESC** (MENU) key, the operation is cancelled, and the display returns to a higher level menu. In other words, if you do not show the **Setting complete** screen, the changes you made up to that point are discarded.

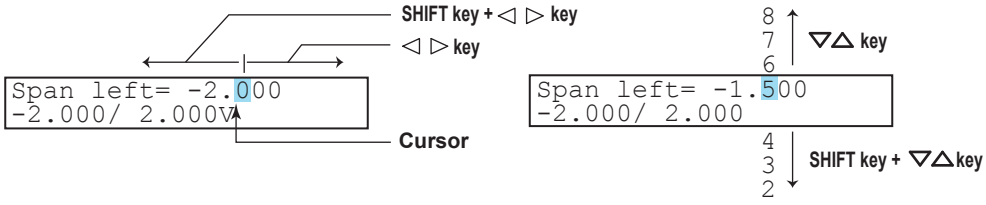
Press the **ESC** (MENU) key while holding down the **SHIFT** (FEED) key to show or hide the comment that is displayed at the bottom half of the screen.

## Entering Values

Press the ◁ ▷ (FUNC) key to move the cursor to the right. Press the **SHIFT** (FEED) + ◁ ▷ (FUNC) to move the cursor to the left.

Press the ▽△ (DISP) key to increment the value. Press the **SHIFT** (FEED) + ▽△ (DISP) key to decrement the value.

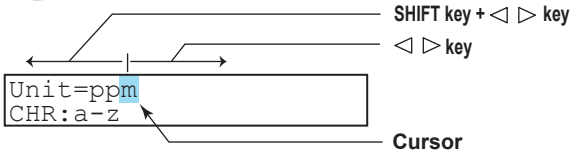
You repeat these steps to enter the value.




When you press the ◁┘ (CH UP) key, the change is applied and the next screen is displayed.

## Entering Characters

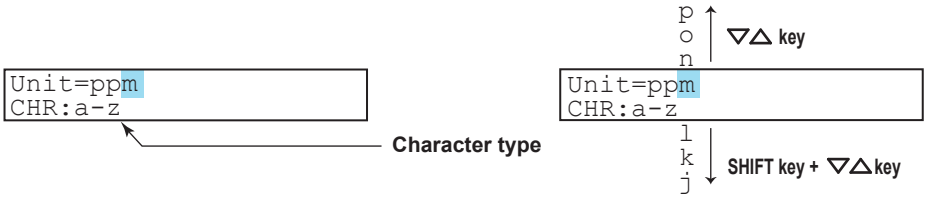
Press the ◁ ▷ (FUNC) key to move the cursor to the right. Press the **SHIFT** (FEED) + ◁ ▷ (FUNC) to move the cursor to the left.



The character type changes each time you press the **CHARACTER** (MENU) key. The character type changes in reverse order each time you press the **SHIFT** (FEED) + **CHARACTER** (MENU) key.
The character types change in the following order: uppercase alphabet (**A-Z**), lowercase alphabet (**a-z**), numbers (**0-9**), and symbols (**%-.**).

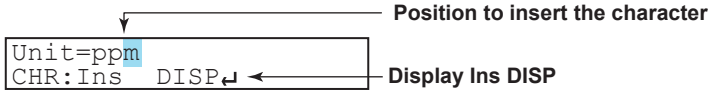
| | |
|---|---|
| **A-Z** | A to Z, and space |
| **a-z** | a to z, and space |
| **0-9** | 0 to 9, and space |
| **%-.** | %, #, °, @, +, –, *, /, (, ), µ, Ω, ², ³, ., and space |

The character changes each time you press the ▽△ (DISP) key. The character changes in reverse order each time you press the **SHIFT** (FEED) + ▽△ (DISP) key.




You repeat these steps to enter the character.
When you press the ◁┘ (CH UP) key, the change is applied and the next screen is displayed.

- **Inserting a Character**
  Press the ◁ ▷ (FUNC) key to move the cursor to the position where the character is to be inserted.
  Press the ▽△ (DISP) key to show **Ins DISP** and then press the ▽△ (DISP) key. A space for one character is inserted. Enter the character.




- **Deleting a Character**
  Use the ◁ ▷ (FUNC) key to move the cursor to the character to be deleted.
  Press the **CHARACTER** (MENU) key to show **Del DISP** and then press the ▽△ (DISP) key. The character is deleted.

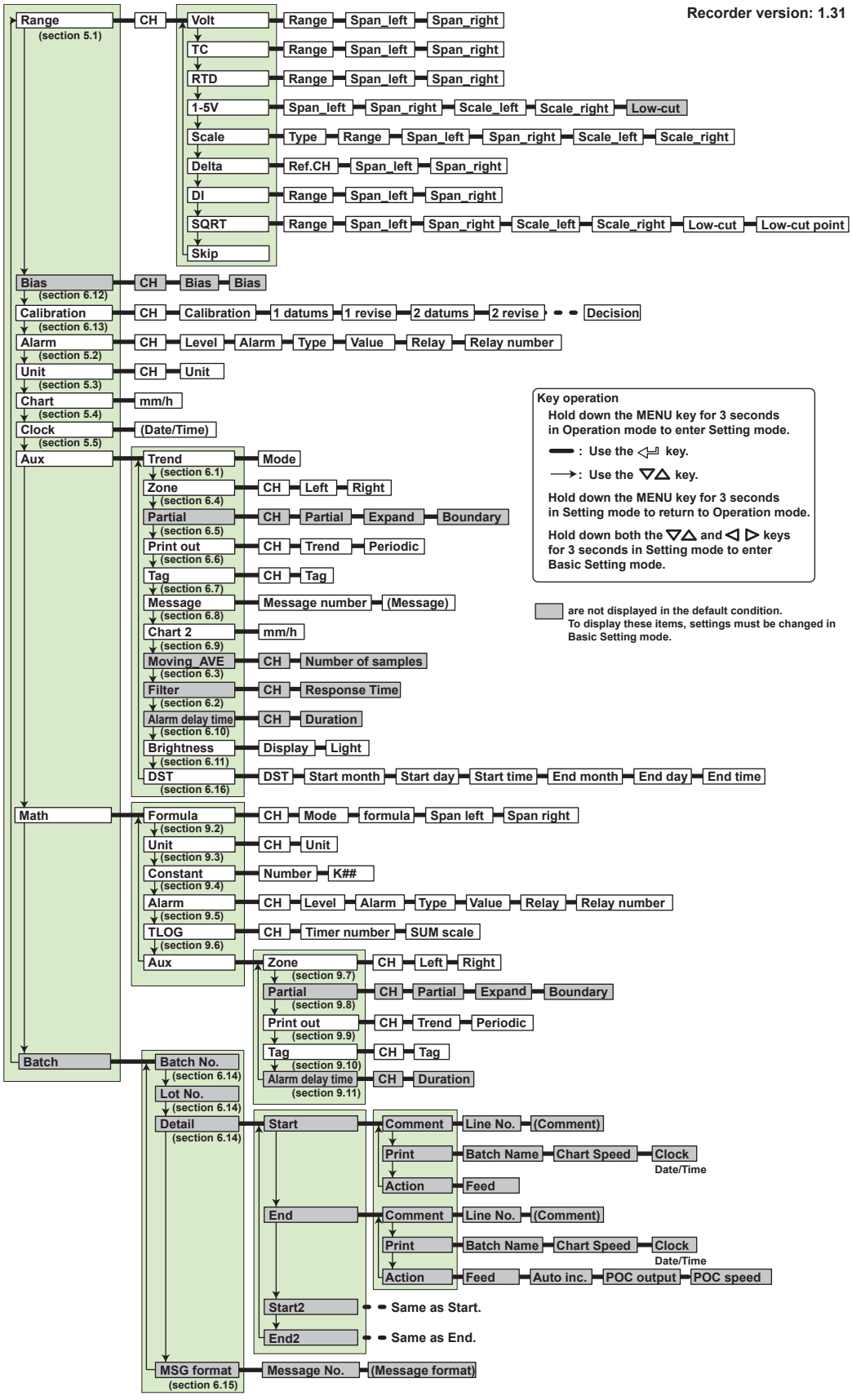
- **Deleting an Entire Character String**
  Press the **CHARACTER** (MENU) key to show **Clear DISP** and then press the ▽△ (DISP) key. The entire character string is deleted.

- **Copying & Pasting a Character String**
  Show the copy source character string.
  Press the **CHARACTER** (MENU) key to show **Copy DISP** and then press the ▽△ (DISP) key. The character string is saved to the memory.
  Show the copy destination.
  Press the **CHARACTER** (MENU) key to show **Paste DISP** and then press the ▽△ (DISP) key. The character string is pasted.

  * When the ◁ ▷ (FUNC), ▽△ (DISP), or **CHARACTER** (MENU) key is pressed while holding down the **SHIFT** (FEED) key, the operation is reversed as when the respective key is pressed by itself.

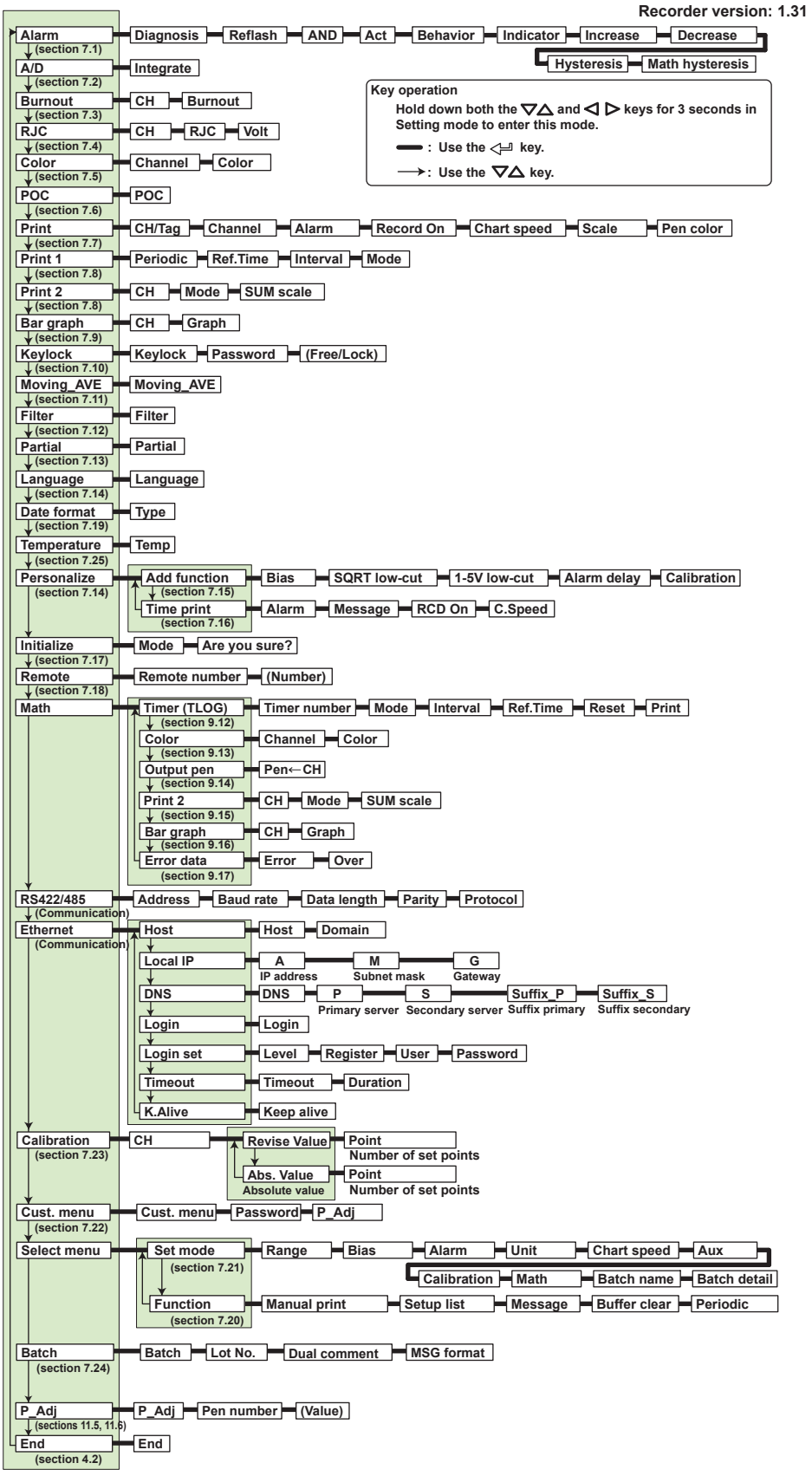
## Menu Structure of Setting Mode

References to the *μR20000 Recorder User's Manual* (IM 04P02B01-01E) are given in parentheses.



## Menu Structure of Basic Setting Mode

References to the *μR20000 Recorder User's Manual* (IM 04P02B01-01E) are given in parentheses.



# Preparing to Record

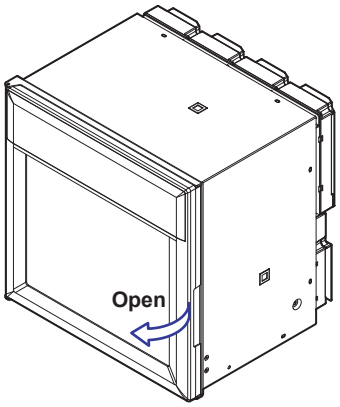
## Loading or Replacing the Chart Paper

**CAUTION**

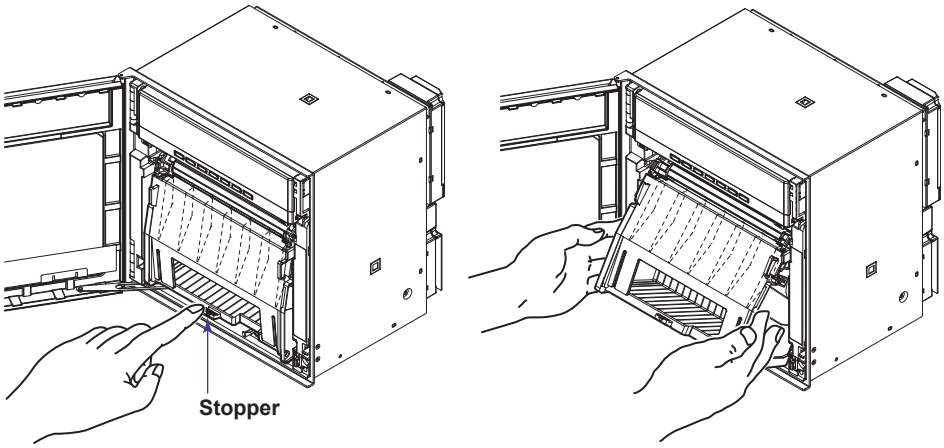
- Do not install or remove the chart cassette with the chart paper guide open. This may damage the stopper.
- Continuing to record or print without the chart paper on the dot model can cause damage to the chart cassette platen (the cylindrical section that holds the paper during the recording operation). Be sure to replace the chart paper ahead of time.
- When attaching the chart cassette, push it in until you hear the stopper click into place. Recordings will be inaccurate if the chart cassette is not fixed in place with the stopper.

### Loading the Chart Paper

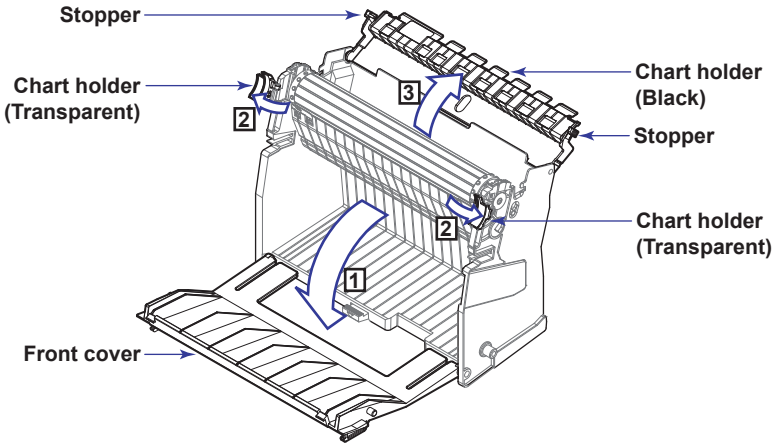
1. Open the door.
   If recording is in progress, press the RCD key to stop the recording.



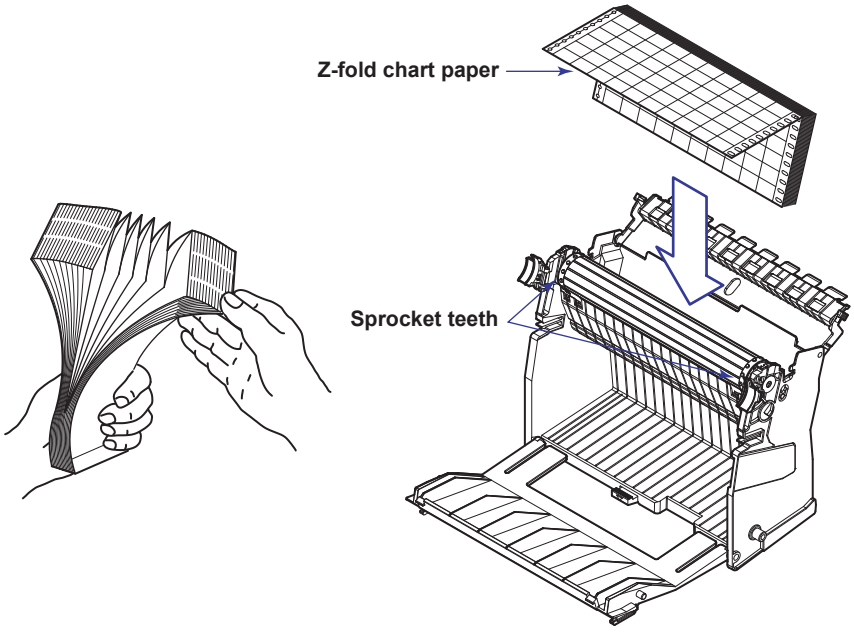

2. Remove the chart cassette.
   Gently press the center stopper inward. The bottom section of the chart cassette comes out. Gently lift the chart cassette and pull it out from the recorder case.



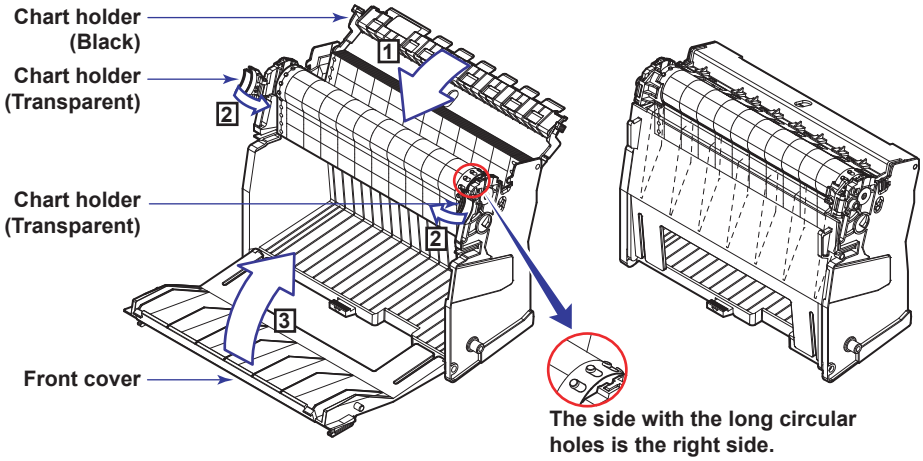
**3.** Open the front cover, the chart holder (transparent plastic) of the sprocket section, and the chart holder (black plastic). Open the chart holder (black plastic) while gently pressing the stopper on either side.



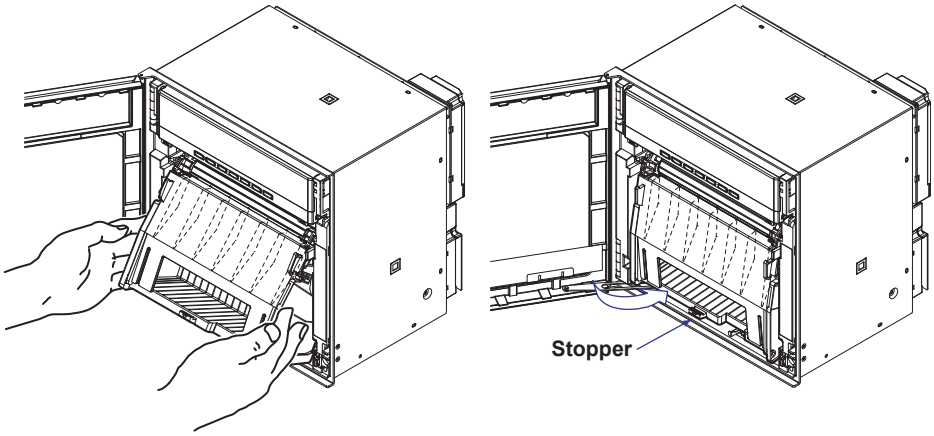

**4.** Load the chart paper.
Riffle the chart thoroughly before loading.
Make sure that the sprocket teeth of the chart drives are properly engaged in the chart paper perforations. Make sure not to load the chart paper backwards.



**5.** Close the chart holder and close the front cover.




**6.** Replace the chart cassette back into the recorder case.
Align the left and right projections with the guide grooves of the recorder and press the entire chart cassette into the recorder case. Push in the chart cassette until it is fixed in place with the stopper.




## Feeding the Chart Paper

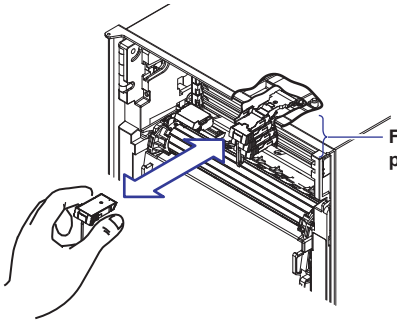
**7.** Press the FEED key to assure that the chart moves two or more folds smoothly into the chart receiver.
If it moves unsteadily, do the installing procedure again.

## Installing/Replacing Felt Pens (Pen Model)

**CAUTION**

- Do not press or pinch the felt tip to prevent deformation.
- Do not move the penholder left or right by force to protect the driving mechanism.
- Make sure to remove the pen cap before installation.
- Use pen caps of the same ink color. If a pen cap of a different ink color is used on the pen, the remaining ink in the cap may be absorbed through the pen tip, and the ink may change its color.

1. Open the door.
   If recording is in progress, press the RCD key to stop the recording.
2. Open the display and key panel section.
   Hold the left and right tabs and pull the display and key panel section toward you. The section opens upward.
3. Hold the felt pen cartridge and pull it out from the pen holder.
   If the pen (pen holder) is at a position that is not easily accessible, see “When the Pen (Pen Holder) Is at a Position That Is Not Easily Accessible” below.
4. Remove the cap from the new felt pen and insert the pen firmly into the pen holder.




5. Return the display and key panel section to its original position.

### When the Pen (Pen Holder) Is at a Position That Is Not Easily Accessible

If the pen (pen holder) is at a position that is not easily accessible, carry out the procedure below to move it near the center position.

1. Press the FUNC key.
2. Press the ▽△ (DISP)key several times to display the **Pen exchange** screen.

   Func=Pen exchange

3. Press the ◁┘ (CH UP) key.
   The pen (pen holder) moves near the center position, and the **Pen exchange = End** screen appears.

***Note***

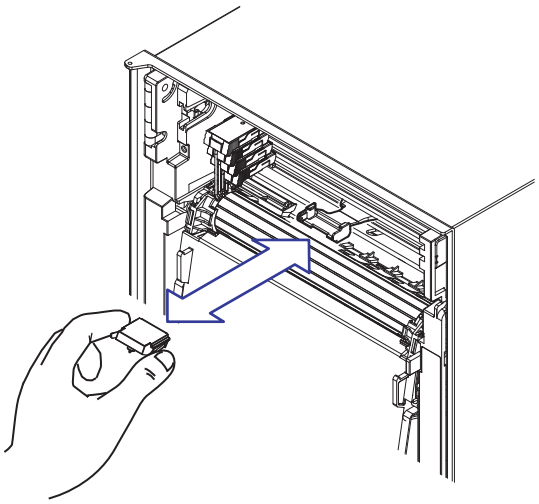
When the pen moves, a line is drawn on the chart paper.

4. Replace the pen.
5. Return the display and key panel section to its original position, and press the ◁┘ (CH UP) key.
   The screen returns to the data display screen.

* When the ◁ ▷ key or ▽△ key is pressed while holding down the **SHIFT** key, the operation is reversed as when the respective key is pressed by itself.

## Installing/Replacing the Plotter Pen (Pen Model)

1. Open the door.
   If recording is in progress, press the RCD key to stop the recording.
2. Open the display and key panel section.
3. Hold the plotter pen cartridge and pull it out from the pen holder.
4. Remove the cap from the new plotter pen and insert the pen firmly into the pen holder.



5. Return the display and key panel section to its original position.

## Installing/Replacing the Ribbon Cassette (Dot Model)

**CAUTION**

- Improper cassette insertion may cause the color to change or damage the ribbon.
- Do not apply upward force to the printer carriage. If you do, the carriage position may be offset, and the recorder may not print correctly.

1. Open the door.
   If recording is in progress, press the RCD key to stop the recording.
2. Press the FUNC key.
3. Press the ▽△ (DISP) key several times to display **Ribbon exchange**.

   ```
   Func=Ribbon exchange
   ```

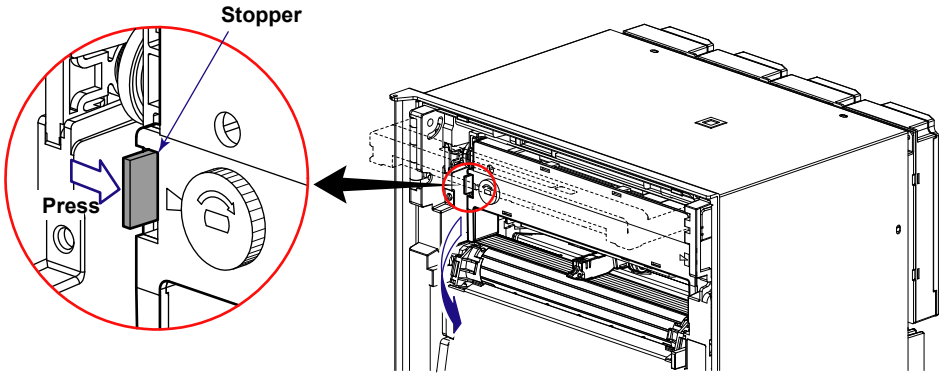
4. Press the ◁┘ (CH UP) key.
   The printer carriage moves near the center position, and **Ribbon exchange = End** is displayed.
5. Open the display and key panel section.
   Hold the left and right tabs and pull the display and key panel section toward you. The section opens upward.

***Note***

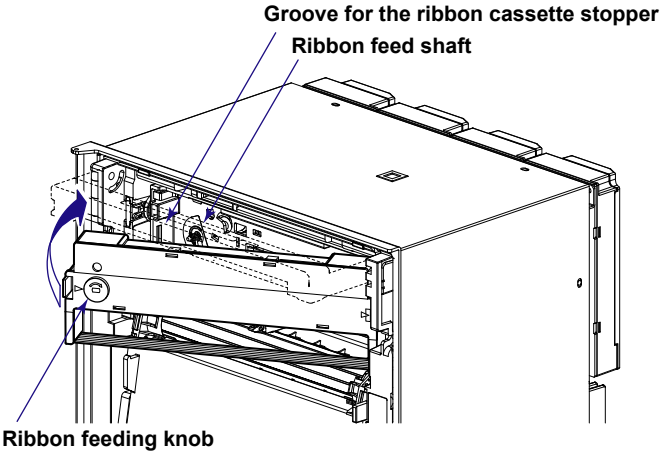
If the recorder is OFF, hold the printer carriage and move it near the center position.

* When the ◁ ▷ key or ▽△ key is pressed while holding down the **SHIFT** key, the operation is reversed as when the respective key is pressed by itself.

6. Remove the ribbon cassette.
   Press the stopper of the ribbon cassette to the right and pull the ribbon cassette out.




7. Install a new ribbon cassette.
   First, insert the right-hand part and then the left-hand part into the cassette holder. Check that the cassette is properly engaged with the cassette holder tab.
   If inserting the ribbon cassette is difficult, turn the ribbon feeding knob in the direction of the arrow to align the ribbon feeding shaft of the cassette with the ribbon feeding shaft of the holder.




8. Turn the ribbon feeding knob in the direction of the arrow a half turn or more to check that the ribbon is feeding properly. If the ribbon is loose, turn the knob in the direction of the arrow to tighten it.
9. Return the display and key panel section to its original position, and press the ⏎ (CH UP) key.
   The screen returns to the data display screen.

# Checking or Setting the Date/Time

## Checking the Date/Time

The date/time is shown on the display when the DISP key is pressed several times.

## Setting the Date/Time

1. Hold down the MENU key for 3 seconds to enter Setting mode.
2. Press the ▽△ key to show **Clock** and then press the ⏎ key.

   Set=Clock

3. Set the date and time and press the ⏎ key.

   04/01/17 10:39:47 ← **Year/Month/Day Hour:Minute:Second**

   Press the ◁ ▷ key to select the desired digit. Press the ▽△ key to select the value.

   Example: Changing from January to May in the figure below
   Press the ◁ ▷ key three times to move the cursor to the month position. Next, press the ▽△ key four times to change the value from 1 to 5.

   **Before change** 04/01/17 10:39:47 → **After change** 04/05/17 10:39:47

4. When the **Setting complete** screen appears, press the ESC/? key.

   Clock
   Setting complete

5. Hold down the MENU key for 3 seconds to return to Operation mode.

**Explanation**

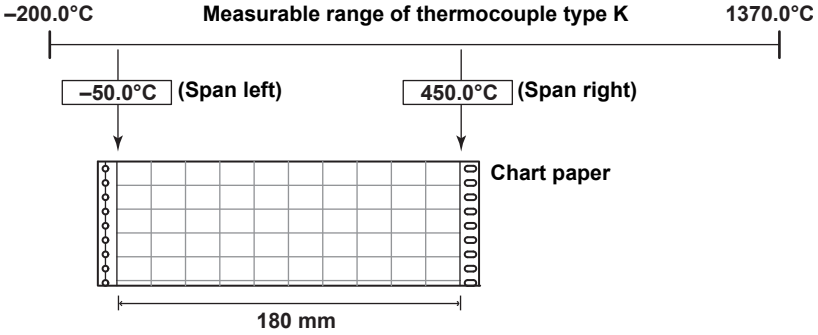
The date format can be changed by date format type of basic setting mode.

* When the ◁ ▷ key or ▽△ key is pressed while holding down the **SHIFT** key, the operation is reversed as when the respective key is pressed by itself.

# Setting the Input Range and Alarm on Measurement Channels

## Setup Example (1) of Thermocouple Input

Set channel 02 to thermocouple type K and measure temperatures in the range –50.0 to 450.0°C. The measurable range for thermocouple type K is –200.0 to 1370.0°C.
The measured values in the range of –50.0 to 450.0°C are recorded in a width of 180 mm on the chart paper. This recording range is called a *recording span*, and the leftmost and rightmost values of the recording span are called *span left* and *span right*, respectively.




### Entering Setting Mode

1. Hold down the MENU key for 3 seconds to enter Setting mode.

### Selecting the Range

2. Press the ◁┘ key with **Range** shown on the screen.

```
Set=Range
Input range and record
```
← **Displays a description of the setup item.**

### Selecting the Channel Range

3. Press the ▽△ key to set the first channel to **02** and then press the ◁┘ key.

**First channel Last channel**

```
CH=02-02
First channel 01-06
```
← **Displays the selectable range of channels.**

4. Likewise, set the last channel to **02** and then press the ◁┘ key.

### Selecting the Input Type

5. Press the ▽△ key to select **TC** and then press the ◁┘ key (see “Explanation” on page 40).

```
Mode=TC
Thermocouple
```

6. Press the ▽△ key to select **K** and then press the ◁┘ key.

```
Range=K
R,S,B,K,E,J,T,N,W,L,U,
```
← **Displays the thermocouple type.**

### Setting Span Left

7. Set Span left to **–50.0** and press the ◁┘ key.
   Press the ◁ ▷ key to select the desired digit.
   Press the ▽△ key to select the value.

```
Span left= -50.0
-200.0/ 1370.0°C
```
← **Displays the measurable range of thermocouple type K.**

* When the ◁ ▷ key or ▽△ key is pressed while holding down the **SHIFT** key, the operation is reversed as when the respective key is pressed by itself.

### Setting Span Right

8. Likewise, set Span right to **450.0** and press the ⏎ key.

```
Span right=  450.0
-200.0/ 1370.0°C
```

The **Setting complete** screen is displayed. When this screen is displayed, the settings entered up to then are applied.

### Finishing the Settings

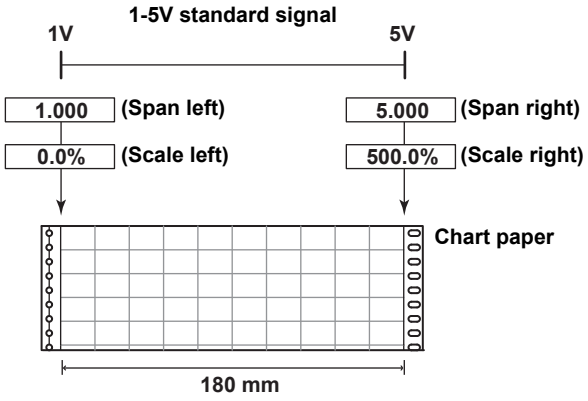
9. When **Setting complete** screen is displayed, do either of the following:
   Press the ⏎ key to set other channels.
   To finish setting the input range, press the **ESC** key.

```
02-02 Channel
Setting complete
```

10. Hold down the MENU key for 3 seconds to return to Operation mode.

## Setup Example (2) of 1-5V Input and unit

Set channel 03 to 1 to 5V standard signal input and 0.0 to 500.0% scale. The scaling range is –20000 to 30000. The scaling range is –20000 to 30000 excluding the decimal point.
The measured values in the range of 0.0 to 500.0% are recorded in a width of 180 mm on the chart paper.




### Entering Setting Mode

1. Hold down the MENU key for 3 seconds to enter Setting mode.

### Selecting the Range

2. Press the ⏎ key with **Range** shown on the screen.

```
Set=Range
Input range and record
```

← **Displays a description of the setup item.**

### Selecting the Channel Range

3. Press the ▽△ key to set the first channel to **03** and then press the ⏎ key.

**First channel Last channel**

```
CH=03-03
First channel 01-06
```

← **Displays the selectable range of channels.**

4. Likewise, set the last channel to **03** and then press the ⏎ key.

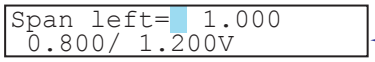
* When the ◁ ▷ key or ▽△ key is pressed while holding down the **SHIFT** key, the operation is reversed as when the respective key is pressed by itself.

### Selecting the Input Type

5. Press the ▽△ key to select **1-5V** and then press the ◁┘ key (see “Explanation” on page 40).

### Setting Span Left

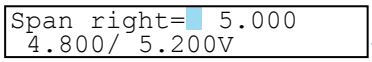
6. Set Span left to **1.000** and press the ◁┘ key.
   Press the ◁ ▷ key to select the desired digit.
   Press the ▽△ key to select the value.




**Displays the range of Span left.**

### Setting Span Right

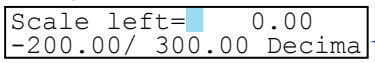
7. Likewise, set Span right to **5.000** and press the ◁┘ key.




**Displays the range of Span right.**

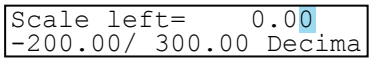
### Setting the Decimal Position and Scaling Left

8. Display Scale left.

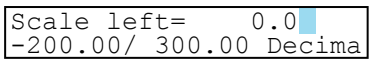



**Displays the scaling range.**

9. Press the ◁ ▷ key to select the desired digit.

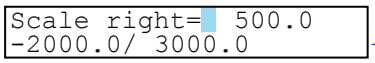



10. Press the ▽△ key to select space and then press the ◁┘ key (Scale left is set to **0.0**).




### Setting Scaling Right

11. Likewise, set Scale right to **500.0** and press the ◁┘ key.

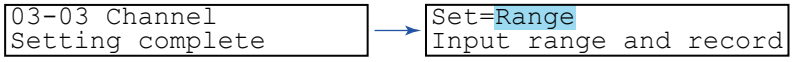



**Displays the scaling range.**

The **Setting complete** screen is displayed. When this screen is displayed, the settings entered up to then are applied.

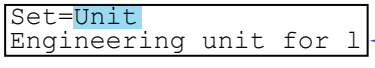
### Finishing the Settings

12. When **Setting complete** screen is displayed, press the **ESC** key.
    The **Set=Range** screen is displayed.




### Setting the Unit

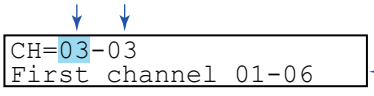
13. Press the ▽△ key to select **Unit** and then press the ◁┘ key.




**Displays the description of setting item.**

14. Press the ▽△ key to set the first channel to **03** and then press the ◁┘ key.

**First channel Last channel**




**Displays the selectable range of channels.**

15. Likewise, set the last channel to **03** and then press the ◁┘ key.

* When the ◁ ▷ key or ▽△ key is pressed while holding down the **SHIFT** key, the operation is reversed as when the respective key is pressed by itself.

### Selecting the Unit

**16.** Use the CHARACTER key and ▽△ key to set **unit character** and then press the ⏎ key. (For the procedure, see “Entering Characters” on page 24. For the characters that can be used, see “Explanation” on page 40.)

```
Unit:
CHR:%-
```

### Finishing the Unit Setting

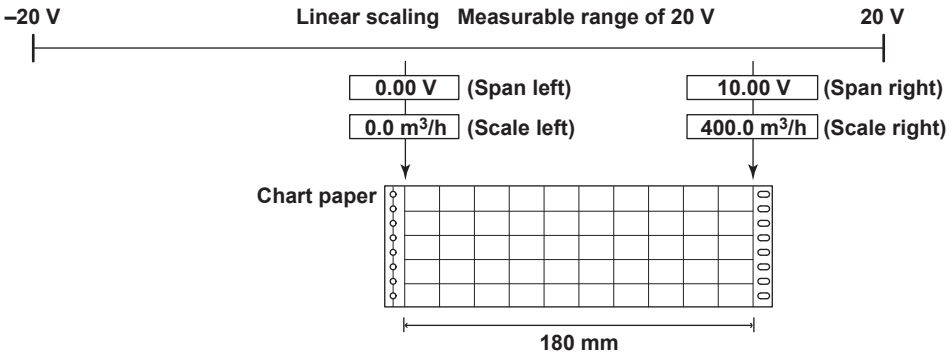
**17.** When **Setting complete** screen is displayed, press the **ESC** key.

```
03-03 Channel
Setting complete
```

**18.** Hold down the MENU key for 3 seconds to return to Operation mode.

## Setup Example (3) of 0 to 10 V Input

Set channel 04 to 0 to 10 V input and measure the range 0.0 to 400.0 $m^3/h$. The 20 V DC voltage range is used. The unit is converted using the linear scaling function. The scaling range is –20000 to 30000 excluding the decimal point.
The measured values in the range of 0.0 to 400.0 $m^3/h$ are recorded in a width of 180 mm on the chart paper.




### Entering Setting Mode

**1.** Hold down the MENU key for 3 seconds to enter Setting mode.

### Selecting the Range

**2.** Press the ⏎ key with **Range** shown on the screen.

```
Set=Range
Input range and record
```
← **Displays a description of the setup item.**

### Selecting the Channel Range

**3.** Press the ▽△ key to set the first channel to **04**, and then press the ⏎ key.

**First channel Last channel**

```
CH=04-04
First channel 01-06
```
← **Displays the selectable range of channels.**

**4.** Likewise, set the last channel to **04** and then press the ⏎ key.

* When the ◁ ▷ key, ▽△ key, or **CHARACTER** key is pressed while holding down the **SHIFT** key, the operation is reversed as when the respective key is pressed by itself.

### Selecting the Input Type

**5.** Press the ▽△ key to select **Scale**, and press the ◁┘ key (for the selectable settings, see “Explanation” on page 40).

```
Mode=Scale
Scales and records the
```

**6.** Press the ▽△ key to select **Volt** and then press the ◁┘ key.

```
Type=Volt
DC Voltage
```

**7.** Press the ▽△ key to select **20V** and then press the ◁┘ key.

```
Range=20V
20mV-50V
```

### Setting Span Left

**8.** Set Span left to **0.00**, and press the ◁┘ key.
Press the ◁ ▷ key to select the desired digit. Press the ▽△ key to select the value.

```
Span left=    0.00
 -20.00/  20.00V
```

← **Displays the range of span left.**

### Setting Span Right

**9.** Likewise, set Span right to **10.00**, and press the ◁┘ key.

```
Span right=  10.00
 -20.00/  20.00V
```

← **Displays the range of span right.**

### Setting the Decimal Position and Scale Left

**10.** Display Scale left.

```
Scale left=   0.00
-200.00/ 300.00
```

← **Displays the scaling range.**

**11.** Press the ◁ ▷ key to select the desired digit.

```
Scale left=    0.00
-200.00/ 300.00
```

**12.** Press the ▽△ key to select space and then press the ◁┘ key (Scale left is set to **0.0**).

```
Scale left=    0.0
-200.00/ 300.00
```

### Setting Scale Right

**13.** Likewise, set Scale right to **400.0**, and press the ◁┘ key.

```
Scale right=  400.0
-2000.0/ 3000.0
```

The **Setting complete** screen is displayed. When this screen is displayed, the settings entered up to then are applied.

### Finishing the Settings

**14.** When the **Setting complete** screen is displayed, press the **ESC** key.
The **Set=Range** screen is displayed.

```
04-04 Channel
Setting complete
```

→

```
Set=Range
Input range and record
```

### Setting the Unit and Finishing the Unit Settings

See steps 13 to 17 in Setup Example (2).

**15.** Hold down the MENU key for 3 seconds to return to Operation mode.

* When the ◁ ▷ key or ▽△ key is pressed while holding down the **SHIFT** key, the operation is reversed as when the respective key is pressed by itself.

**Explanation**

***Note***

If the range is changed after setting the alarm, the alarm setting becomes invalid. When you change the range, check the alarm setting.

In step 5 of setup examples (1), (2), and (3), you can select an input type or a computation type on the table below.

| Mode | Description |
|---|---|
| TC | Thermocouple |
| RTD | Resistance temperature detector |
| Volt | DC voltage |
| DI | ON/OFF input |
| 1-5V | 1-5VDC: 1-5V is scaled to values in the appropriate unit to be used as measured values. Also, the low-cut function (input less than 0% is fixed to 0% value) can be used. |
| Delta | The value obtained by subtracting the measured value of another channel (called the reference channel) from the input value of the channel set to delta computation is used as the measured value of that channel. |
| Scale | The input values are scaled to values in the appropriate unit to be used as measured values. |
| SQRT | The square root of the input value is calculated, the result is scaled to a value in the appropriate unit, and used as the measured value of the channel. Also, the low-cut function (input less than a given measured value is fixed to 0) can be used. |
| Skip | Disables measurement, display, periodic printout, and trend recording (dot model). |

- **Input Type and Measurable Range**

**Thermocouple (Mode: TC)**

| Range Type | Measurable Range |
|---|---|
| R | 0.0 to 1760.0°C |
| S | 0.0 to 1760.0°C |
| B | 0.0 to 1820.0°C |
| K | –200.0 to 1370.0°C |
| E | –200.0 to 800.0°C |
| J | –200.0 to 1100.0°C |
| T | –200.0 to 400.0°C |
| N | 0.0 to 1300.0°C |
| W | 0.0 to 2315.0°C |
| L | –200.0 to 900.0°C |
| U | –200.0 to 400.0°C |
| WRe | 0.0 to 2400.0°C |

**RTD (Mode: RTD)**

| Range Type | Measurable Range |
|---|---|
| PT (Pt100) | –200.0 to 600.0°C |
| JPT (JPt100) | –200.0 to 550.0°C |

**DC voltage (Mode: Volt)**

| Range Type | Measurable Range |
|---|---|
| 20mV | –20.00 to 20.00 mV |
| 60mV | –60.00 to 60.00 mV |
| 200mV | –200.0 to 200.0 mV |
| 2V | –2.000 to 2.000 V |
| 6V | –6.000 to 6.000 V |
| 20V | –20.00 to 20.00 V |
| 50V | –50.00 to 50.00 V |

**ON/OFF input (Mode: DI)**

| Range Type | Measurable Range |
|---|---|
| Level | 0 to 1 |
| Cont | 0 to 1 |

### Characters That Can Be Used for Units

A unit is set using up to six characters.

The available characters are as follows:

Alphabet, numbers, symbols (%, #, °, @, +, –, *, /, (, ), µ, Ω, $^{2}$, $^{3}$, .), and space

# Setting the Alarm

## Setup Example

Set a high limit alarm at 400.0°C on channel 02. The relay output (option) is not available.

## Entering Setting Mode

1. Hold down the MENU key for 3 seconds to enter Setting mode.

## Selecting the Channel

2. Press the ↵ key with **Alarm** shown on the screen.

```
Set=Alarm
Alarm setting
```
← **Displays a description of the setup item.**

3. Press the ▽△ key to set the first channel to **02** and then press the ↵ key.

**First channel** **Last channel**

```
CH=02-02
First channel 01-06
```
← **Displays the selectable range of channels.**

4. Likewise, set the last channel to **02** and then press the ↵ key.

## Setting the Alarm Condition

5. Press the ▽△ key to select **1** and then press the ↵ key.
   Up to four alarms can be set on a single channel. Each alarm is distinguished by its level: alarm level 1 to 4. In this example, alarm level 1 is used.

```
Level=1
1-4
```
← **Displays the selectable range.**

6. Press the ▽△ key to select **On** and then press the ↵ key.
   On: Enables the alarm of the selected alarm level.

```
Alarm=On
On/Off
```
← **Displays possible choices.**

7. Press the ▽△ key to select **H** and then press the ↵ key.
   The letter “H” represents the high limit alarm (see “Explanation”).

```
Type=H
High limit alarm
```
← **Displays a description of the selected type.**

8. Set the alarm value to **400.0** by carrying out the key operations below.
   Press the ◁ ▷ key to select the desired digit.
   Press the ▽△ key to select the value.
   When all digits have been set, press the ↵ key.

```
Value=  400.0
-200.0/ 1370.0°C
```
← **Displays the measurable range of the input range specified on the channel.**

## Setting the Relay Output

9. Since the relay output is not used, press the ↵ key with **Off** selected.

```
Relay=Off
On/Off
```
← **Displays possible choices.**

The **Setting complete** screen is displayed. When this screen is displayed, the settings entered up to then are applied.

* When the ◁ ▷ key or ▽△ key is pressed while holding down the **SHIFT** key, the operation is reversed as when the respective key is pressed by itself.

### Finishing the Settings

**10.** When **Setting complete** screen is displayed, do either of the following:
Press the ⏎ key to set other alarms.
To finish setting the alarm, press the **ESC** key.

```
02-02 CH/level 1
Setting complete
```

**11.** Hold down the MENU key for 3 seconds to return to Operation mode.

**Explanation**

In step 7, you can select an alarm type on the table below.

| Type | Description |
|---|---|
| H | High Limit Alarm: An alarm occurs when the input value exceeds the alarm value. |
| L | Low Limit Alarm: An alarm occurs when the input value falls below the alarm value. |
| h | Difference High Limit Alarm*1: An alarm occurs when the difference in the input values of two channels is greater than or equal to the specified value. |
| l | Difference Low Limit Alarm*1: An alarm occurs when the difference in the input values of two channels is less than or equal to the specified value. |
| R | High Limit on Rate-of-Change Alarm*2: The rate-of-change of the measured values is checked over a certain time (interval). An alarm occurs if the rate-of-change of the measured value in the rising direction is greater than or equal to the specified value. |
| r | Low Limit on Rate-of-Change Alarm*2: The rate-of-change of the measured values is checked over a certain time (interval). An alarm occurs if the rate-of-change of the measured value in the falling direction is greater than or equal to the specified value. |
| T | Delay High Limit Alarm*3: An alarm occurs when the measured value remains above the alarm value for a specified time period (alarm delay period). |
| t | Delay Low Limit Alarm*3: An alarm occurs when the measured value remains below the alarm value for a specified time period (alarm delay period). |

*1 Can be specified on channels set to delta computation.

*2 You must set the interval in Basic Setting mode.

*3 You can select T or t when the alarm delay function is enabled in Basic Setting mode.

# Recording/Displaying Data

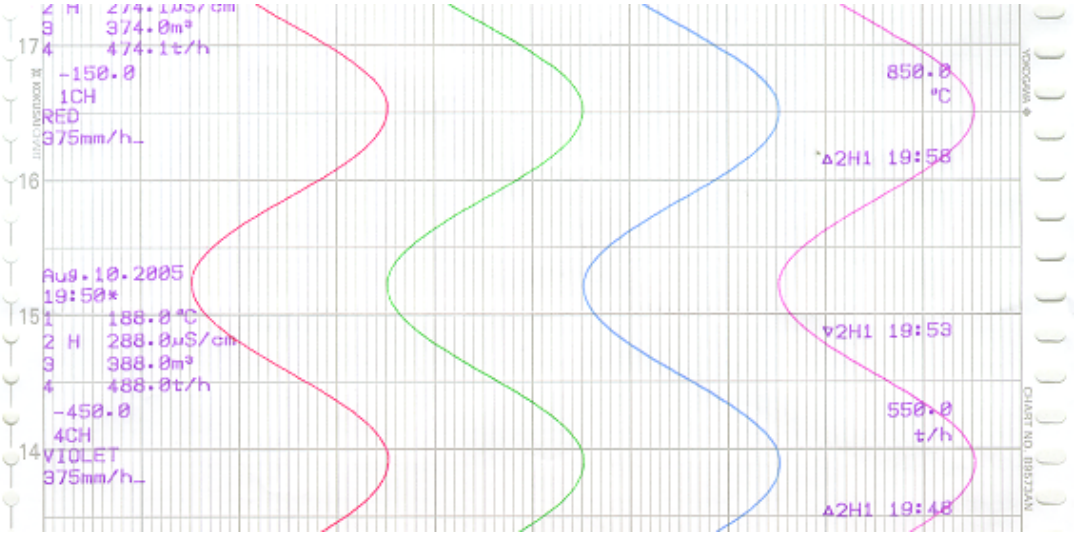
## Starting the Recording

Press the RCD key to start recording.
The status display shows the word “RECORD.”

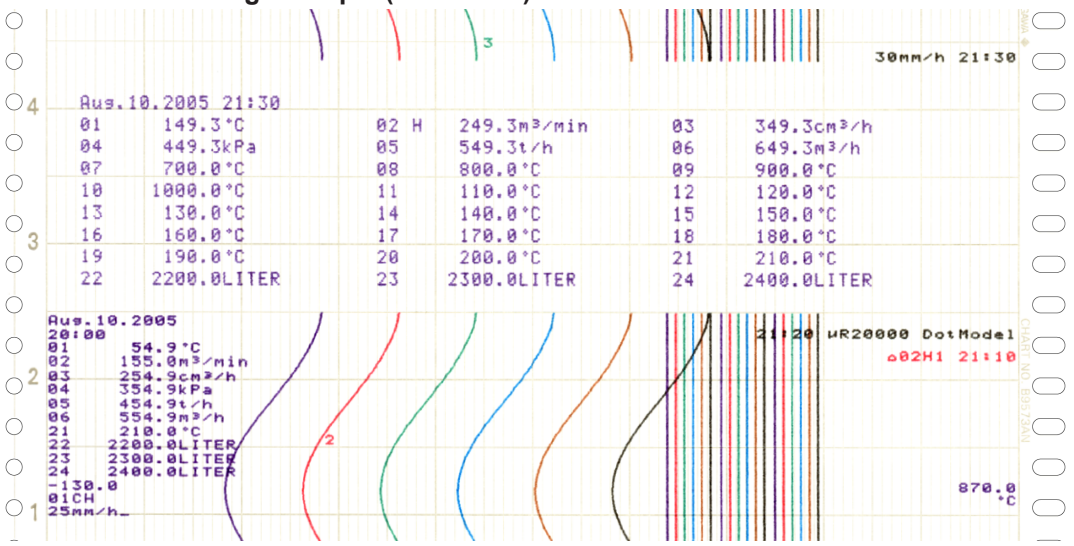
***Note***

For models with the FAIL/chart end detection and output function (/F1 option), the chart feed will not start even when pressing the RCD key if the chart paper is empty or almost out. Insert new chart paper before pressing the RCD key.

**Recording Example (Pen Model)**




**Recording Example (Dot Model)**




The recording examples may appear differently from the actual recording as a result of functional improvements made on the recorder after this manual was written.

## Stopping the Recording

While recording is in progress, press the RCD key to stop recording.
The word “RECORD” on the status display clears.

## Feeding the Chart Paper

The chart paper is fed while the FEED key is held down.

## Changing the Chart Speed

1. Hold down the MENU key for 3 seconds to enter Setting mode.
2. Press the ▽△ key to show **Chart** and then press the ↵ key.

```
Set=Chart
Chart speed
```

**Displays a description of the setup item.**

3. Set the chart speed and press the ↵ key.

```
mm/h=  25
1/1500mm/h
```

**Current chart speed.**
**Displays the range that can be specified.**
**(Display example on the dot model)**

On the pen model, press the ▽△ key to select the chart speed.

**Chart speed on the pen model (unit: mm/h)**

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 5 | 6 | 8 | 9 | 10 | 12 | 15 | 16 | 18 | 20 |
| 24 | 25 | 30 | 32 | 36 | 40 | 45 | 48 | 50 | 54 |
| 60 | 64 | 72 | 75 | 80 | 90 | 96 | 100 | 120 | 125 |
| 135 | 150 | 160 | 180 | 200 | 225 | 240 | 250 | 270 | 300 |
| 320 | 360 | 375 | 400 | 450 | 480 | 500 | 540 | 600 | 675 |
| 720 | 750 | 800 | 900 | 960 | 1000 | 1080 | 1200 | 1350 | 1440 |
| 1500 | 1600 | 1800 | 2000 | 2160 | 2250 | 2400 | 2700 | 2880 | 3000 |
| 3600 | 4000 | 4320 | 4500 | 4800 | 5400 | 6000 | 7200 | 8000 | 9000 |
| 10800 | 12000 | | | | | | | | |

On the dot model, enter a vale to set the chart speed The chart speed can be set in the range of 1 to 1500 mm/h in 1 mm steps.
Press the ◁ ▷ key to select the desired digit.
Press the ▽△ key to select the value.

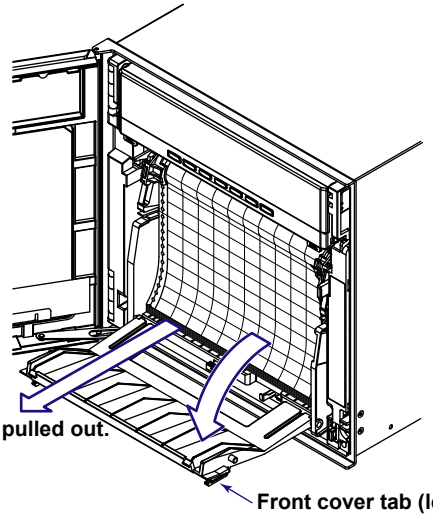
4. When the **Setting complete** screen appears, the new chart speed is applied.

```
Chart speed
Setting complete
```

Press the **ESC** key to change the chart speed again.
Hold down the MENU key for 3 seconds to return to Operation mode.

## Viewing the Recorded Results

Pull the front cover tab of the chart cassette to open the front cover. The recorded chart paper can be pulled out for viewing.



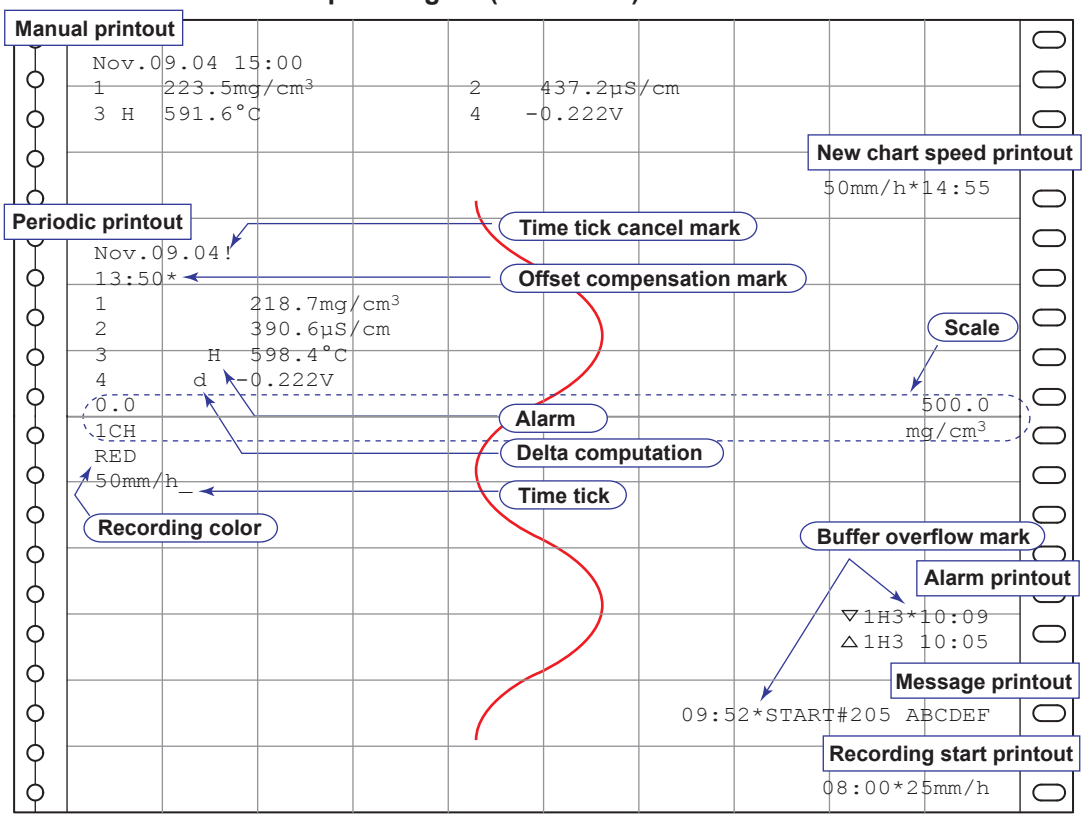
**Recorded chart paper can be pulled out.**

**Front cover tab (left and right)**

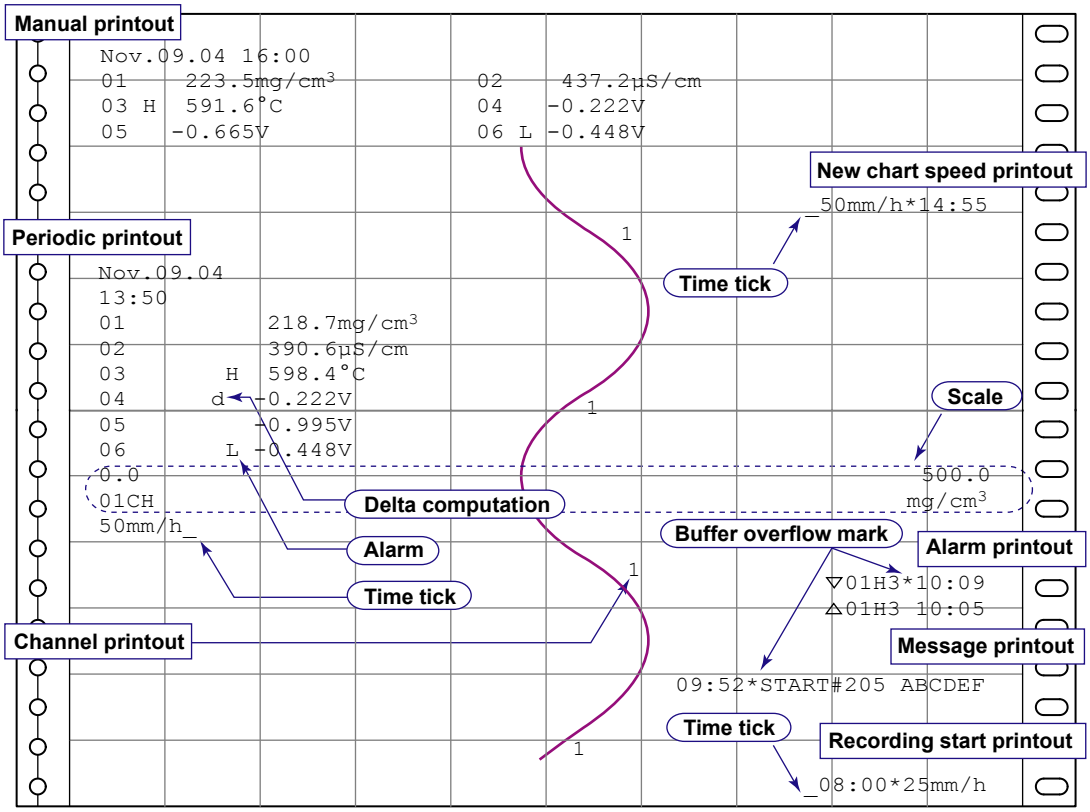
* When the ◁ ▷ key or ▽△ key is pressed while holding down the **SHIFT** key, the operation is reversed as when the respective key is pressed by itself.

# Description of the Printout Contents

## Printout Description Figure (Pen Model)




## Printout Description Figure (Dot Model)

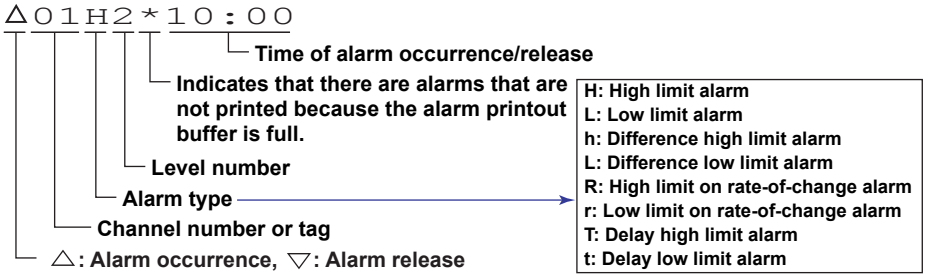


The printout description figures are for explaining the printout contents. The font is different from the actual printout. The printout positions are also slightly different.

- **Manual Printout**
  Prints the current measured values and alarm statuses of all channels by operating the keys.
- **New Chart Speed Printout**
  When the chart speed is changed, the time tick (dot model), the date/time of change, and the new chart speed are printed. The time ticks are marks that indicate the positions of the date/time on the chart paper. An asterisk (*) shows there are messages that cannot be printed.
- **Periodic Printout**
  Measured values and other items are printed at the preset interval. For details, see appendix 1 and 2 in the *μR20000 Recorder User's Manual* (IM 04P02B01-01E) on the CD-ROM.
  - **Printout Contents**
    The date/time, time tick, measured value and channel status for each channel, the channel scale (the leftmost and rightmost values of the span), and the chart speed are printed. On the pen model, if a time tick is not printed at the correct position, a time tick cancel mark (!) is printed. Pen offset compensation mark is printed when the function to compensate the pen offset along the time axis is enabled.
  - **Printout Interval**
    The printout interval can be set by specifying the value or set automatically in sync with the chart speed.

### Alarm Printout

Alarm information is printed when an alarm occurs or releases.


△01H2*10:00
Time of alarm occurrence/release
Indicates that there are alarms that are not printed because the alarm printout buffer is full.
Level number
Alarm type
Channel number or tag
△: Alarm occurrence, ▽: Alarm release
H: High limit alarm
L: Low limit alarm
h: Difference high limit alarm
L: Difference low limit alarm
R: High limit on rate-of-change alarm
r: Low limit on rate-of-change alarm
T: Delay high limit alarm
t: Delay low limit alarm

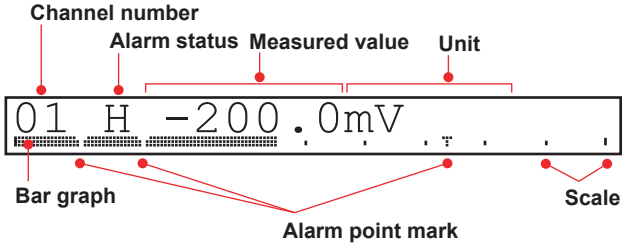
Alarms that occur while an alarm printout is in progress are temporarily saved to the buffer memory in a printout-wait condition. Alarms are cleared from the buffer memory when they are printed. A buffer overflow mark is printed when there are alarms that cannot be printed because the buffer is full.

- **Message Printout**
  An arbitrary character string from five character strings set in advance can be printed on the chart paper. Each message can be set using up to 16 characters.
  If message printout is executed while another message is being printed, the most recent message is temporarily stored to the buffer memory in a printout-wait condition. Messages are cleared from the buffer memory when they are printed. A buffer overflow mark is printed when there are messages that cannot be printed because the buffer is full.
- **Recording Start Printout**
  When recording is started, the time tick (dot model), the time, and the chart speed can be printed. By factory default, the recording start printout is disabled. An asterisk (*) shows there are messages that cannot be printed.
- **Channel Printout (Dot Model)**
  Prints the channel number or tag by the trend recording.

## Switching the Display Screen

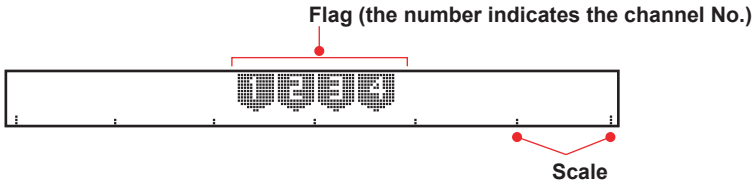
The screen switches each time the DISP key is pressed. Screen 01 through 15 are switched in order. Screens that are set to “Skip” (See “Display Types” on the page 49) are skipped. Below is a display example.

### Display Example (1-channel digital + bar graph display)

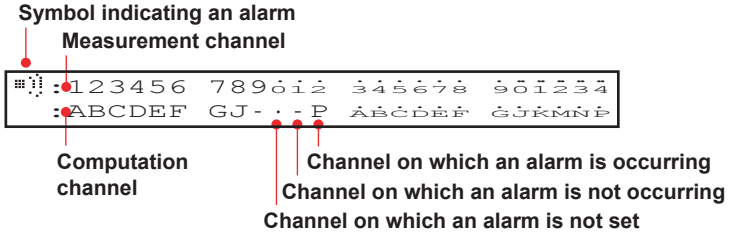



- **Channel Auto Switching**
  On screens that show the measured values and computed values, the displayed channel is automatically switched in ascending order. The switching interval can be set to 1 s, 2 s, 3 s, 4 s, or 5 s.
- **Switching the Displayed Channel Using Keys**
  If auto switching is not specified, the channel switches each time the CH UP key is pressed in ascending order. All channels are displayed in order.

### Display Example (Flag Display)

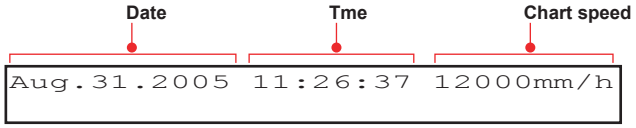



### Display Example (Alarm Status Display)

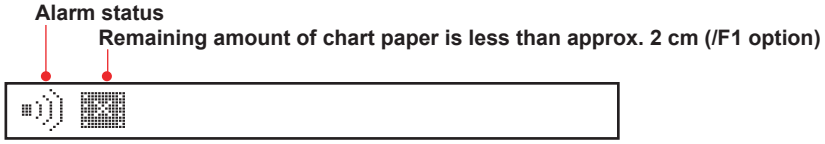

Symbol indicating an alarm
Measurement channel
Computation channel
Channel on which an alarm is occurring
Channel on which an alarm is not occurring
Channel on which an alarm is not set

### Display Example (Date/Time and Chart Speed Display)

The date format can be specified.




### Display Example (Status Display)



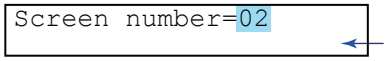
## Changing the Displayed Information

Different display types can be registered to screens 01 to 15. As an example, the procedure of assigning 1-channel digital display (tag display) to screen 02 is explained below.

1. Hold the MENU key for 3 seconds to show the data display setup screen.

### Selecting the Screen Number

2. Press the ▽△ key to select screen number **02** and then press the ⏎ key.

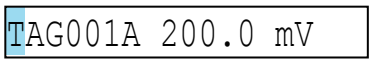



**Displays the current display type name.**

A sample screen of the display type appears. A section of the display blinks to indicate that this is a data display setup screen.

### Selecting the Display Type

3. The display switches each time the ▽△ key is pressed. Select the **TAG001A** (Tag_1CH digital) display and then press the ⏎ key.

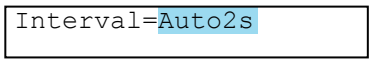



4. Press the ▽△ key to set the channel switching interval and then press the ⏎ key.

   Interval: Sets the channel switching interval. Select the interval from 1 s, 2 s, 3 s, 4 s, 5 s, and manual.

   Auto1s, Auto2s, Auto3s, Auto4s, Auto5s: Switches the displayed channel at the specified time interval.

   Manual: Switch the displayed channel manually.




5. When the **Setting complete** screen appears, the new setting is applied.

Press the ⏎ key to register display types to other screens.

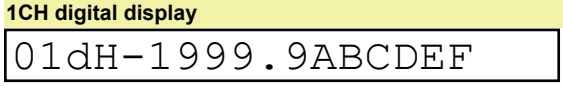
Hold the MENU key down for 3 seconds to exit from the data display setup screen.

* When the ◁ ▷ key or ▽△ key is pressed while holding down the **SHIFT** key, the operation is reversed as when the respective key is pressed by itself.

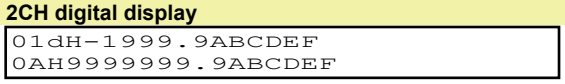
## Display Types

In addition to the types on page 47, display types listed below are available.

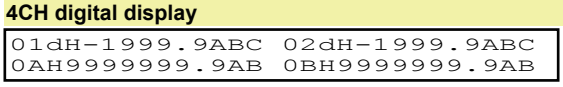
**1CH digital display**



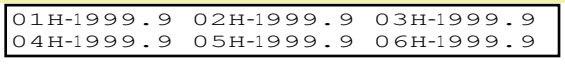

**2CH digital display**



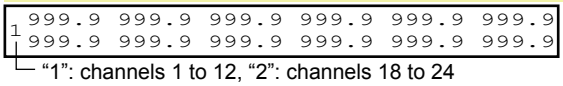

**4CH digital display**




**6CH digital display (Dot model)**



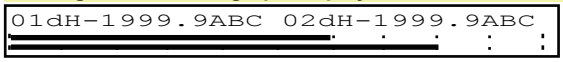

**12CH digital display (12-, 18-, or 24-dot model)**



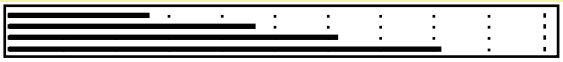

"1": channels 1 to 12, "2": channels 18 to 24

**1CH digital + 4CH bargraph display (Pen model)**

**2CH digital + 2CH bar graph display**




**4CH bargraph display (Pen model)**



**DI/DO display**

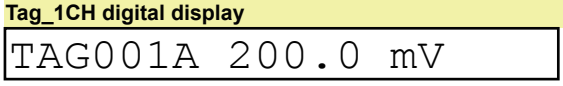
□: OFF ■: ON

**DI: Remote control inputs**
**DO: Alarm output relays**

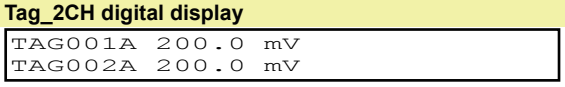
**Multiple display**

(Different screens can be assigned to the top and bottom sections.)

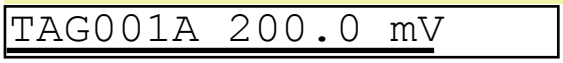
**Tag_1CH digital display**



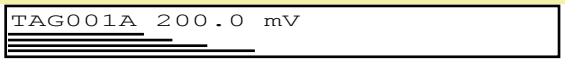

**Tag_2CH digital display**



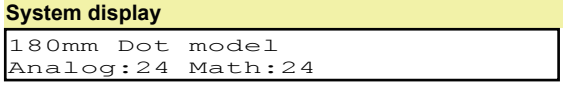

**Tag_1CH digital + 1CH bargraph display**




**Tag_1CH digital + 4CH bargraph display (Pen model)**

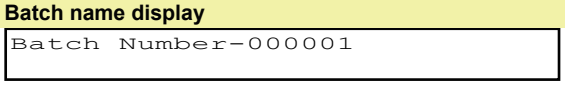



**System display**




The displayed contents switches every three seconds.

**Batch name display**




Batch number (26 characters) + lot number (4 or 6 digits) (/BT1 option)

**Lights out**

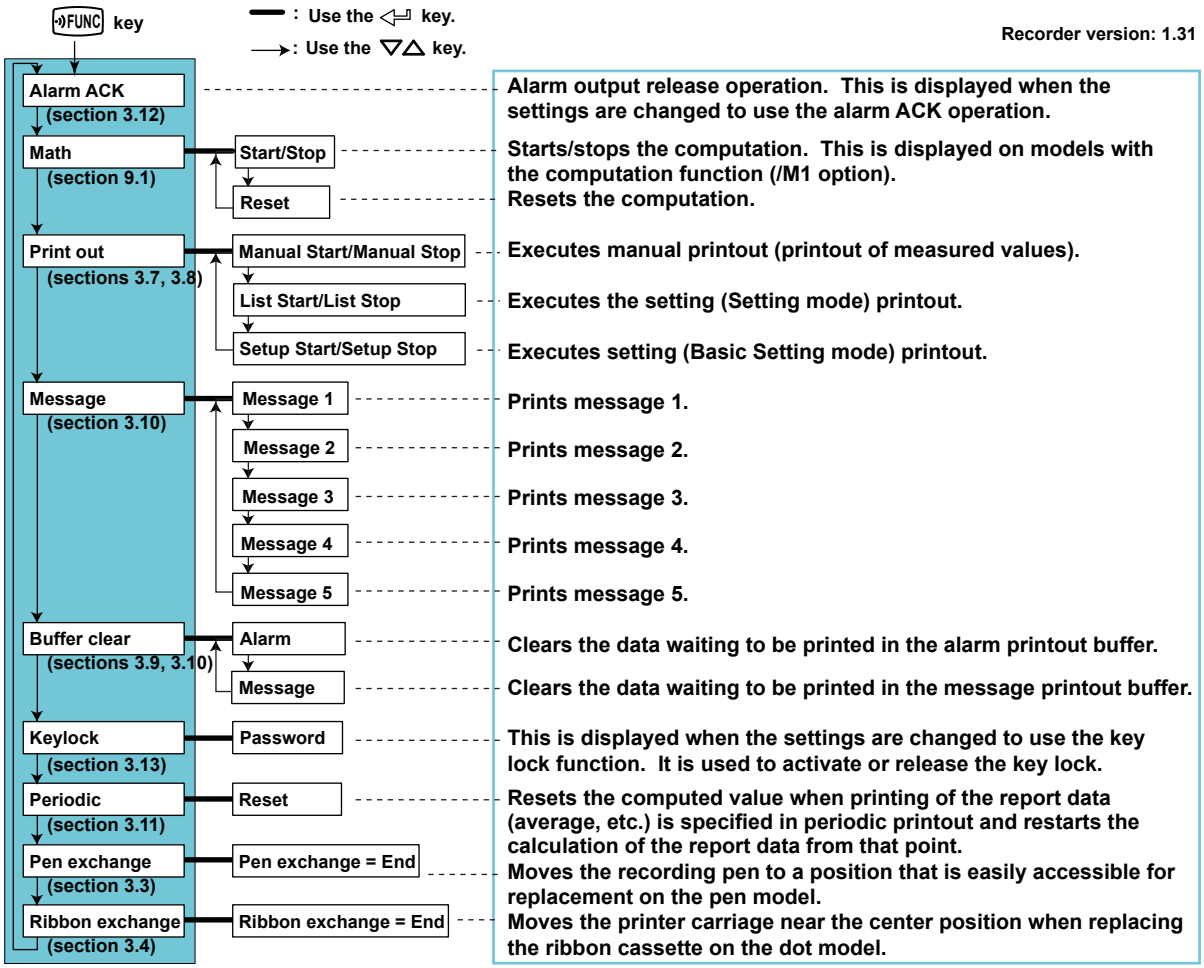
No display.

**Skip**

No display type is registered. Skips the screen during screen switching.

## FUNC Key Operations in Operation Mode

The operations below can be carried out with the FUNC key in Operation mode. References to the *μR20000 Recorder User's Manual* (IM 04P02B01-01E) provided on the CD-ROM are given in parentheses.


FUNC key
: Use the ⏎ key.
: Use the ▽△ key.
Recorder version: 1.31
Alarm ACK
(section 3.12)
Alarm output release operation. This is displayed when the settings are changed to use the alarm ACK operation.
Math
(section 9.1)
Start/Stop
Starts/stops the computation. This is displayed on models with the computation function (/M1 option).
Reset
Resets the computation.
Print out
(sections 3.7, 3.8)
Manual Start/Manual Stop
Executes manual printout (printout of measured values).
List Start/List Stop
Executes the setting (Setting mode) printout.
Setup Start/Setup Stop
Executes setting (Basic Setting mode) printout.
Message
(section 3.10)
Message 1
Prints message 1.
Message 2
Prints message 2.
Message 3
Prints message 3.
Message 4
Prints message 4.
Message 5
Prints message 5.
Buffer clear
(sections 3.9, 3.10)
Alarm
Clears the data waiting to be printed in the alarm printout buffer.
Message
Clears the data waiting to be printed in the message printout buffer.
Keylock
(section 3.13)
Password
This is displayed when the settings are changed to use the key lock function. It is used to activate or release the key lock.
Periodic
(section 3.11)
Reset
Resets the computed value when printing of the report data (average, etc.) is specified in periodic printout and restarts the calculation of the report data from that point.
Pen exchange
(section 3.3)
Pen exchange = End
Moves the recording pen to a position that is easily accessible for replacement on the pen model.
Ribbon exchange
(section 3.4)
Ribbon exchange = End
Moves the printer carriage near the center position when replacing the ribbon cassette on the dot model.

## Printing Measured Values (Manual Printout)

The measured values of all channels are printed.

### Starting the Manual Printout

1. Press the FUNC key.
   The **FUNC=** screen appears.
2. Press the ▽△ key to select **Print out** and then press the ⏎ key.
   ```
   Func=Print out
   ```
3. Press the ⏎ key with **Manual Start** shown on the screen.
   Manual printout starts. The screen returns to the data display screen.
   ```
   Print=Manual Start
   ```

***Note***

- When manual printout is executed, trend recording is suspended. However, the recorder continues the measurement and alarm detection (in the background).
- When manual printout is complete, trend recording resumes.
- If an alarm occurs during the manual printout, the alarm is printed after the recording resumes.

* When the ◁ ▷ key or ▽△ key is pressed while holding down the **SHIFT** key, the operation is reversed as when the respective key is pressed by itself.

### Aborting the Manual Printout

1. Press the FUNC key.
2. Press the ▽△ key to select **Print out** and then press the ⏎ key.
3. Press the ⏎ key with **Manual Stop** shown on the screen.
   Manual printout stops. The screen returns to the data display screen.

```
Print=Manual Stop
```

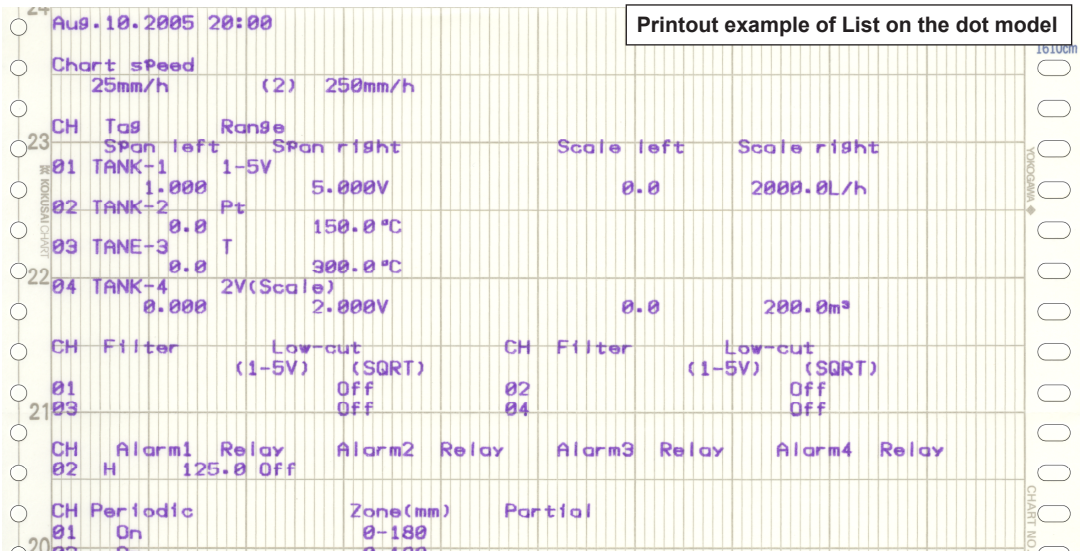
## Printing the Recorder Settings

This section explains the procedure for printing the recorder settings. There are two sets of settings that can be printed: List and Setup.

List: Prints the settings of Setting mode (input range for each channel, etc.)

Setup: Prints the settings of Basic Setting mode

**Printout example of List on the dot model**




### *Note*

- The printout takes several minutes to tens of minutes to complete.
- When printout is executed, trend recording is suspended. However, the recorder continues the measurement and alarm detection (in the background).
- When printout is complete, trend recording resumes.
- If an alarm occurs during the printout, the alarm is printed after the recording resumes.

### Starting the List Printout

1. Press the FUNC key.
2. Press the ▽△ key to select **Print out** and then press the ⏎ key.

```
Func=Print out
```

3. Press the ▽△ key to show **List Start** and then press the ⏎ key.
   The List printout starts. The screen returns to the data display screen.

```
Print=List Start
```

### Aborting the List Printout

1. Press the FUNC key.
2. Press the ▽△ key to select **Print out** and then press the ⏎ key.
3. Press the ▽△ key to show **List Stop** and then press the ⏎ key.
   The List printout stops. The screen returns to the data display screen.

```
Print=List Stop
```

* When the ◁ ▷ key or ▽△ key is pressed while holding down the **SHIFT** key, the operation is reversed as when the respective key is pressed by itself.

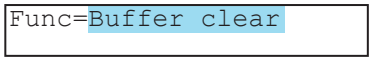
### Starting/Stopping the Setup Printout

Setup printout can be started/stopped in a similar fashion to List printout. For Setup printout, select **Setup Start** and **Setup Stop**.

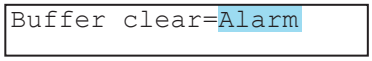
## Clearing the Alarm Printout Buffer

Alarm information waiting to be printed is temporarily stored in the buffer memory. This operation clears all of the alarm information in the buffer. This function can be used to prevent unneeded alarm printouts from being executed.

1. Press the FUNC key.
2. Press the ▽△ key to select **Buffer clear** and then press the ◁┘ key.




3. Press the ◁┘ key with **Alarm** shown on the screen.
   The data in the alarm printout buffer is cleared. The screen returns to the data display screen.




## Printing a Message

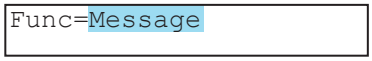
This section explains the procedure for printing the preset character strings. For details on setting the character strings, see section 6.8, “Setting the Message String” in the *μR20000 Recorder User’s Manual* (IM 04P02B01-01E) on the CD-ROM.

***Note***

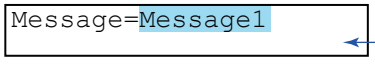
- Messages can be printed only during trend recording. However, regardless of whether trend recording is in progress or not, messages waiting to be printed are temporarily stored in the buffer memory.
- Message printouts are not performed when the chart speed is greater than or equal to 1600 mm/h and 101 mm/h on the pen model and dot model, respectively.

### Printing a Message

1. Press the FUNC key.
2. Press the ▽△ key to select **Message** and then press the ◁┘ key.




3. Press the ▽△ key to select the message number and then press the ◁┘ key.
   The message printout starts. The screen returns to the data display screen.

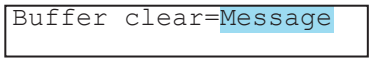



**Displays the preset message.**

### Clearing the Message Printout Buffer

Messages waiting to be printed are temporarily stored in the buffer memory. This operation clears the messages in the buffer.

1. Press the FUNC key.
2. Press the ▽△ key to select **Buffer clear** and then press the ◁┘ key.
3. Press the ▽△ key to select **Message** and then press the ◁┘ key.
   The data in the message printout buffer is cleared. The screen returns to the data display screen.




* When the ◁ ▷ key or ▽△ key is pressed while holding down the **SHIFT** key, the operation is reversed as when the respective key is pressed by itself.

## Releasing the Alarm Output (Alarm ACK Operation)

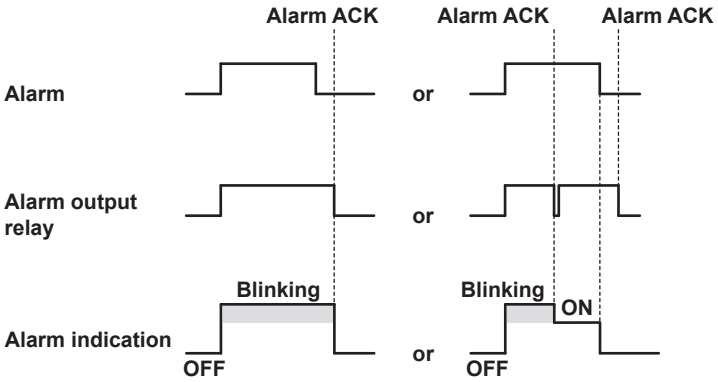
This operation releases the alarm indication or relay output (/A1, /A2, /A3, /A4, or /A5 option) when the alarm indication or output relay is set to hold operation. For details on the hold operation, see section 1.3, “Alarms” in the *µR20000 Recorder User’s Manual* (IM 04P02B01-01E) on the CD-ROM.

1. Press the FUNC key.
2. Press the ⏎ key with **Alarm ACK** shown on the screen.
   The alarm indication or relay output is released. The screen returns to the data display screen.

```
Func=Alarm ACK
```

**Description**

### Alarm ACK Operation and the Actions of the Alarm Output Relay/Alarm Display




## Activating/Releasing the Key Lock

When the recorder is configured to use the key lock function, this operation activates or releases the key lock. For details on setting the key lock function, see section 7.10, “Setting the Key Lock Function” in the *µR20000 Recorder User’s Manual* (IM 04P02B01-01E) on the CD-ROM.

### Activating the Key Lock

1. Press the FUNC key.
2. Press the ▽△ key to select **Keylock** and then press the ⏎ key.
   The key lock is activated. The screen returns to the data display screen.

### Releasing the Key Lock

***Note***

A password is required to release the key lock.

1. Press the FUNC key.
2. Press the ▽△ key to select **Keylock** and then press the ⏎ key.
3. Enter the password for releasing the key lock. The password values are shown with asterisks.
   Press the ◁ ▷ key to select the desired digit.
   Press the ▽△ key to select the value.

```
Password=
```

4. Press the ⏎ key.
   The key lock is released. The screen returns to the data display screen.

* When the ◁ ▷ key or ▽△ key is pressed while holding down the **SHIFT** key, the operation is reversed as when the respective key is pressed by itself.

# Setup Items and Default Values

## Setup Items in Setting Mode and Their Default Values (Recorder version: 1.31)

The items with an asterisk are not displayed in the default condition. To display these items, settings must be changed in Basic Setting mode.

| Setup Item | Pen/Dot | Selectable Range or Selections | Default Value |
|---|---|---|---|
| Range > CH | - | 01 to 24 | 01 |
| Range > Mode | - | Volt/TC/RTD/1-5V/Scale/Delta/DI/SQRT/Skip | Volt |
| Range > Mode > Range | - | 20mV/60mV/200mV/2V/6V/20V/50V/1-5V/<br>R/S/B/K/E/J/T/N/W/L/U/WRe/Pt/JPt/Level/Cont/<br>(Slections for /N1 and /N3 options) | 2V |
| *Bias > CH | - | 01 to 24 | 01 |
| *Bias > Bias | - | On/Off | Off |
| *Bias > Bias | - | ±10 % of the span of the measurable range | - |
| Calibration (/CC1 option) | | | |
| Calibration > CH | - | 01 to 24 | 01 |
| Calibration > Calibration | - | On/Off | Off |
| Calibration > datums | - | Within the range | - |
| Calibration > revise | - | Within the range<br>(correction point + correction value for revise value) | - |
| Calibration > Decision | - | Yes/No | Yes |
| Alarm > CH | - | 01 to 24 | 01 |
| Alarm > Level | - | 1/2/3/4 | 1 |
| Alarm > Alarm | - | On/Off | Off |
| Alarm > Type | - | H/L/h/l/R/r (*/T/t) | H |
| Alarm > Value | - | Depends on the alarm type. | - |
| Alarm > Relay | - | On/Off | Off |
| Alarm > Relay number | - | I01 to I06, I11 to I16, I21 to I26, I31 to I36 | I01 |
| Unit > CH | - | 01 to 24 | 01 |
| Unit > Unit | - | 6 characters or less | Blank |
| Chart | Pen Model | 82 types (pen model) | 25 mm/h |
| | Dot Model | 1 to 1500 mm/h (dot model) | 25 mm/h |
| Clock | - | Date/Time | - |
| Aux > Trend | Dot Model | Auto/Fix | Auto |
| Aux > Zone > CH | - | 01 to 24 | 01 |
| Aux > Zone > Left, Right | - | Within the recording span range (mm) | Left: 0, Right: 180 |
| *Aux > Partial > CH | - | 01 to 24 | 01 |
| *Aux > Partial > Partial | - | On/Off | Off |
| *Aux > Partial > Expand | - | 1 to 99% | 50 |
| *Aux > Partial > Boundary | - | Within the recording span range | - |
| Aux > Print out > CH | - | 01 to 24 | 01 |
| Aux > Print out > Trend | Dot Model | On/Off | On |
| Aux > Print out > Periodic | - | On/Off | On |
| Aux > Tag > CH | - | 01 to 24 | 01 |
| Aux > Tag > Tag | - | 7 characters or less | 01 to 24 |
| Aux > Message > Message number | - | 1 to 5 | 1 |
| Aux > Message > (Message) | - | 16 characters or less | Blank |
| Aux > Chart2 | Pen Model | 82 types (pen model) | 25 mm/h |
| | Dot Model | 1 to 1500 mm/h (dot model) | 25 mm/h |
| *Aux > Moving_AVE > CH | Dot Model | 01 to 24 | 01 |
| *Aux > Moving_AVE > number of samples | Dot Model | Off, 2 to 16 | Off |
| *Aux > Filter > CH | Pen Model | 01 to 24 | 01 |
| *Aux > Filter > Response time | Pen Model | 2s/5s/10s | Off |
| *Aux > Alarm delay time > CH | - | 01 to 24 | 01 |
| *Aux > Alarm delay time > Duration | - | 0 to 3600s | 10s |
| Aux > Brightness > Display | - | 1/2/3/4/5/6/7/8 | 4 |
| Aux > Brightness > Light | - | 1/2/3/4 | 2 |
| Aux > DST | - | Not/Use | Not |
| Aux > DST > Start month | - | Apr/May/Jun/Jul/Aug/Sep/Oct/Nov/Dec/Jan/Feb/Mar | Apr |
| Aux > DST > Strt day | - | 1st-Sun/.../Last-Mon | 1st-Sun |
| Aux > DST > Start time | - | 0:00 to 23:00 | 0:00 |

| Setup Item | Pen/Dot | Selectable Range or Selections | Default Value |
|---|---|---|---|
| Aux > DST > End month | - | Apr/May/Jun/Jul/Aug/Sep/Oct/Nov/Dec/Jan/Feb/Mar | Apr |
| Aux > DST > End day | - | 1st-Sun/.../Last-Mon | Last-Mon |
| Aux > DST > End time | - | 0:00 to 23:00 | 0:00 |
| Math (/M1 option) | | | |
| Math > Formula > CH | - | 0A/0B/0C/0D/0E/0F/0G/0J/0K/0M/0N/0P | 0A |
| Math > Formula > Mode | - | On/Off | Off |
| Math > Formula > formula | - | 120 characters or less | 01 |
| Math > Unit > CH | - | 0A/0B/0C/0D/0E/0F/0G/0J/0K/0M/0N/0P/ 1A/1B/1C/1D/1E/1F/1G/1J/1K/1M/1N/1P | 0A |
| Math > Unit > Unit | - | 6 characters or less | Blank |
| Math > Constant > No. | - | K01 to K30 | K01 |
| Math > Alarm > CH | - | 0A/0B/0C/0D/0E/0F/0G/0J/0K/0M/0N/0P/ 1A/1B/1C/1D/1E/1F/1G/1J/1K/1M/1N/1P | 0A |
| Math > Alarm > Level | - | 1/2/3/4 | 1 |
| Math > Alarm > Alarm | - | On/Off | Off |
| Math > Alarm > Type | - | H/L (*/T/t) | H |
| Math > Alarm > Value | - | –9999999 to 99999999 excluding the decimal | - |
| Math > Alarm > Relay | - | On/Off | Off |
| Math > Alarm > Relay number | - | I01 to I06, I11 to I16, I21 to I26, I31 to I36 | I01 |
| Math > TLOG > CH | - | 0A/0B/0C/0D/0E/0F/0G/0J/0K/0M/0N/0P/ 1A/1B/1C/1D/1E/1F/1G/1J/1K/1M/1N/1P | 0A |
| Math > TLOG > Timer No. | - | Periodic/1/2 | Periodic |
| Math > TLOG > SUM scale | - | Off, /s, /min, /h, /day | Off |
| Math > Aux > Zone > CH | - | 0A/0B/0C/0D/0E/0F/0G/0J/0K/0M/0N/0P/ 1A/1B/1C/1D/1E/1F/1G/1J/1K/1M/1N/1P | 0A |
| Math > Aux > Zone > Left, Right | - | Within the recording span range (mm) | Left: 0, Right: 180 |
| *Math > Aux > Partial > CH | - | 0A/0B/0C/0D/0E/0F/0G/0J/0K/0M/0N/0P/ 1A/1B/1C/1D/1E/1F/1G/1J/1K/1M/1N/1P | 0A |
| *Math > Aux > Partial > Partial | - | On/Off | Off |
| *Math > Aux > Partial > Expand | - | 1 to 99% | 50 |
| *Math > Aux > Partial > Bound | - | Within the recording span range | - |
| Math > Aux > Print out > CH | - | 0A/0B/0C/0D/0E/0F/0G/0J/0K/0M/0N/0P/ 1A/1B/1C/1D/1E/1F/1G/1J/1K/1M/1N/1P | 0A |
| Math > Aux > Print out > Trend | Dot Model | On/Off | On |
| Math > Aux > Print out > Periodic | - | On/Off | On |
| Math > Aux > Tag > CH | - | 0A/0B/0C/0D/0E/0F/0G/0J/0K/0M/0N/0P/ 1A/1B/1C/1D/1E/1F/1G/1J/1K/1M/1N/1P | 0A |
| Math > Aux > Tag > Tag | - | 7 characters or less | 0A to 1P |
| *Math > Aux > Alarm delay time > CH | - | 0A/0B/0C/0D/0E/0F/0G/0J/0K/0M/0N/0P/ 1A/1B/1C/1D/1E/1F/1G/1J/1K/1M/1N/1P | 0A |
| *Math > Aux > Alarm delay time > Duration | - | 0 to 3600s | 10s |
| Batch (/BT1 option) | | | |
| *Batch > Batch No | - | 26 characters or less | Blank |
| *Batch > Lot No. | - | 0000-9999 or 000000-999999 | 0000 or 000000 |
| *Batch > Detail > Start > Comment > Line No. | - | 1/2/3/4/5 | 1 |
| *Batch > Detail > Start > Comment > (Comment) | - | 64 characters or less | Blank |
| *Batch > Detail > Start > Print > Batch Name | - | On/Off | On |
| *Batch > Detail > Start > Print > Chart Speed | - | On/Off | On |
| *Batch > Detail > Start > Print > Clock | - | On/Off | On |
| *Batch > Detail > Start > Action > Feed | - | 0 to 50 mm | 0 mm |
| *Batch > Detail > End > Comment > Line No. | - | 1/2/3/4/5 | 1 |
| *Batch > Detail > End > Comment > (Comment) | - | 64 characters or less | Blank |
| *Batch > Detail > End > Print > Batch Name | - | On/Off | On |
| *Batch > Detail > End > Print > Chart Speed | - | On/Off | On |
| *Batch > Detail > End > Print > Clock | - | On/Off | On |
| *Batch > Detail > End > Action > Feed | - | 0 to 50 mm | 0 mm |
| *Batch > Detail > End > Action > Auto inc. | - | On/Off | On |
| *Batch > Detail > End > Action > POC output | Pen Model | On/Off | Off |
| *Batch > Detail > End > Action > POC speed | Pen Model | C.Speed/450 mm h | C.Speed |
| *Batch > Detail > Start2 ... Same as Start | | | |
| *Batch > Detail > End2 ... Same as End | | | |
| *Batch > MSG format > Message No. | - | 1/2/3/4/5 | 1 |
| *Batch > MSG format > Message No. > (MSG format) | - | 69 characters or less | H:M L16 |

## Setup Items in Basic Setting Mode and Their Default Values (Recorder version: 1.31)

| Setup Item | Pen/Dot | Selectable Range or Selections | Default Value |
|---|---|---|---|
| Alarm > Diagnosis | - | On/Off | Off |
| Alarm > Reflash | - | On/Off | Off |
| Alarm > AND | - | None/I01/I01-I02/I01-I03/I01-I04/I01-I05/ I01-I06/I01-I11/I01-I12/I01-I13/I01-I14/I01-I15/ I01-I16/I01-I21/I01-I22/I01-I23/I01-I24/I01-I25/ I01-I26/I01-I31/I01-I32/I01-I33/I01-I34/I01-I35/ I01-I36 | None |
| Alarm > Act | - | Energize/De_energize | Energize |
| Alarm > Behavior | - | Nonhold/Hold | Nonhold |
| Alarm > Indicator | - | Nonhold/Hold | Nonhold |
| Alarm > Increase | - | 01 to 15 | 01 |
| Alarm > Decrease | - | 01 to 15 | 01 |
| Alarm > Hysteresis | - | Off/0.1% to 1.0% | 0.5% |
| Alarm > Math hysteresis | - | Off/0.1% to 1.0% | Off |
| A/D > Integrate | Dot Model | Auto/50Hz/60Hz/100ms | Auto |
| | Pen Model | Auto/50Hz/60Hz | Auto |
| Burnout > CH | - | 01 to 24 | 01 |
| Burnout > Burnout | - | Off/Up/Down | Off |
| RJC > CH | - | 01 to 24 | 01 |
| RJC > RJC | - | Internal/External | Internal |
| RJC > RJC > Volt | - | –20000 to 20000 µV | 0 µV |
| Color > Channel | Dot Model | 01 to 24 | 01 |
| Color > Color | Dot Model | Purple/Red/Green/Blue/Brown/Black | 01, 07, 13, 19: Purple<br>02, 08, 14, 20: Red<br>03, 09, 15, 21: Green<br>04, 10, 16, 22: Blue<br>05, 11, 17, 23: Brown<br>06, 12, 18, 24: Black |
| POC > POC | Pen Model | On/Off | Off |
| Print > CH/Tag | - | CH/Tag | CH |
| Print > Channel | Dot Model | On/Off | On |
| Print > Alarm | - | On1/On2/Off | On1 |
| Print > Record On | - | On/Off | Off |
| Print > Chart speed | - | On/Off | On |
| Print > Scale | - | On/Off | On |
| Print > Pen color | Pen Model | On/Off | On |
| Print1 > Periodic | - | Auto/Manual | Auto |
| Print1 > Ref. Time | - | Hour 0 to 23 (1 hour steps) | 00:00 |
| Print1 > Interval | - | 10min/15min/20min/30min/1h/2h/3h/4h/6h/8h/ 12h/24h | 1h |
| Print1 > Mode | - | Inst/Report/Off | Inst |
| Print2 > CH | - | 01 to 24 | 01 |
| Print2 > Mode | - | AVE/MIX/SUM/MIN/MAX/INST | AVE |
| Print2 > SUM scale | - | Off, /s, /min, /h, /day | Off |
| Bar graph > CH | - | 01 to 24 | 01 |
| Bar graph > Graph | - | Normal/Center | Normal |
| Keylock > Keylock | - | Not/Use | Not |
| Keylock > Password | - | Numbers and spaces within 4 digits | Blank |
| Keylock > RCD | - | Free/Lock | Free |
| Keylock > Feed | - | Free/Lock | Free |
| Keylock > Menu | - | Free/Lock | Free |
| Keylock > Disp Menu | - | Free/Lock | Free |
| Keylock > Alarm ACK | - | Free/Lock | Free |
| Keylock > Math | - | Free/Lock | Free |
| Keylock > Print out | - | Free/Lock | Free |
| Keylock > Message | - | Free/Lock | Free |
| Keylock > Buffer clear | - | Free/Lock | Free |
| Keylock > Periodic | - | Free/Lock | Free |
| Keylock > Pen exchange | Pen Model | Free/Lock | Free |
| Keylock > Ribbon exchange | Dot Model | Free/Lock | Free |

| Setup Item | Pen/Dot | Selectable Range or Selections | Default Value |
|---|---|---|---|
| Moving_AVE > Moving_AVE | Dot Model | Not/Use | Not |
| Filter > Filter | Pen Model | Not/Use | Not |
| Partial > Partial | - | Not/Use | Not |
| Language > Lang | - | English/Japanese/German/French | English |
| Date format > Type | - | Y/M/D M/D/Y D/M/Y D.M.Y M.D.Y | M.D.Y |
| Temperature > Temp | - | °C/°F | °C |
| Personalize > Add function > Bias | - | Not/Use | Not |
| Personalize > Add function > SQRT low-cut | - | Not/Use | Use |
| Personalize > Add function > 1-5V low-cut | - | Not/Use | Not |
| Personalize > Add function > Alarm delay | - | Not/Use | Not |
| Personalize > Add function > Calibration | - | Not/Use | Use |
| Personalize > Time print > Alarm | - | HH:MM, HH:MM:SS, M/D H:M, M/D H:M:S, YMD H:M:S | HH:MM |
| Personalize > Time print > Message | - | HH:MM, HH:MM:SS, M/D H:M, M/D H:M:S, YMD H:M:S, None | HH:MM |
| Personalize > Time print > RCD On | - | HH:MM, HH:MM:SS, M/D H:M, M/D H:M:S, YMD H:M:S | HH:MM |
| Personalize > Time print > C.Speed | - | HH:MM, HH:MM:SS, M/D H:M, M/D H:M:S, YMD H:M:S | HH:MM |
| Initialize > Mode | - | Setup+Set/Set | Setup+Set |
| Initialize > Mode > Are you sure? | - | No/Yes | No |
| Remote (/R1 option) | | | |
| Remote > Remote number | - | 1/2/3/4/5 | 1 |
| Remote > No. | - | Record On Off /Chart speed/Time adjust/ Math start stop (/M1)/Math reset (/M1)/ Manual print/Alarm ACK/Message1/Message2/ Message3/Message4/Message5/ Priority R_RCD (/BT1)/BatchCMT switch (/BT1)/ None (/M1, /BT1: option) | Record On/Off |
| Math (/M1 option) | | | |
| Math > Timer (TLOG) > Timer number | - | 1/2 | 1 |
| Math > Timer (TLOG) > Mode | - | Off/Relative/Absolute | Absolute |
| Math > Timer (TLOG) > Interval (Relative) | - | 10 min to 24 h (1 min steps) | 01:00 |
| Math > Timer (TLOG) > Interval (Absolute) | - | 10min/12min/15min/20min/30min/1h/2h/3h/4h/ 6h/8h/12h/24h | 1h |
| Math > Timer (TLOG) > Ref. Time | - | Hour 0 to 23 (1 hour steps) | 00:00 |
| Math > Timer (TLOG) > Reset | - | On/Off | On |
| Math > Timer (TLOG) > Print | - | On/Off | On |
| Math > Color > Channel | Dot Model | 0A/0B/0C/0D/0E/0F/0G/0J/0K/0M/0N/0P/ 1A/1B/1C/1D/1E/1F/1G/1J/1K/1M/1N/1P | 0A |
| Math > Color > Color | Dot Model | Purple/Red/Green/Blue/Brown/Black | Purple: 0A/0G/1A/1G<br>Red: 0B/0J/1B/1J<br>Green: 0C/0K/1C/1K<br>Blue: 0D/0M/1D/1M<br>Brown: 0E/0N/1E/1N<br>Black: 0F/0P/1F/1P |
| Math > Output pen > Pen ← CH | Pen Model | Pen: 1 to 4, Channel: 01 to 04/0A to 0J | 1pen: 01, 2pen: 02, 3pen: 03, 4pen: 04 |
| Math > Print2 > CH | - | 0A/0B/0C/0D/0E/0F/0G/0J/0K/0M/0N/0P/ 1A/1B/1C/1D/1E/1F/1G/1J/1K/1M/1N/1P | 0A |
| Math > Print2 > Mode | - | AVE/MIX/SUM/MIN/MAX/INST | AVE |
| Math > Print2 > SUM scale | - | Off, /s, /min, /h, /day | Off |
| Math > Bar graph > CH | - | 0A/0B/0C/0D/0E/0F/0G/0J/0K/0M/0N/0P/ 1A/1B/1C/1D/1E/1F/1G/1J/1K/1M/1N/1P | 0A |
| Math > Bar graph > Graph | - | Normal/Center | Normal |
| Math > Error data > Error | - | +Over/–Over | +Over |
| Math > Error data > Over | - | Skip/Limit | Skip |

## Setup Items and Default Values

| Setup Item | Pen/Dot | Selectable Range or Selections | Default Value |
|---|---|---|---|
| RS-422/485 (/C3 option) | | | |
| RS-422/485 > Address | - | 1 to 32 | 1 |
| RS-422/485 > Baud rate | - | 1200/2400/4800/9600/19200/38400 | 9600 |
| RS-422/485 > Data length | - | 7/8 | 8 |
| RS-422/485 > parity | - | Odd/Even/None | Even |
| RS-422/485 > Protocol | - | NORMAL/MODBUS | NORMAL |
| Ethernet (/C7 option) | | | |
| Ethernet > Host > Host | - | 64 characters or less | Blank |
| Ethernet > Host > Domain | - | 64 characters or less | Blank |
| Ethernet > Local IP > A | - | IP address | 0.0.0.0 |
| Ethernet > Local IP > M | - | IP address (Subnet mask) | 0.0.0.0 |
| Ethernet > Local IP > G | - | IP address (Default gateway) | 0.0.0.0 |
| Ethernet > DNS > DNS | - | On/Off | Off |
| Ethernet > DNS > P | - | IP address (Primary DNS sever) | 0.0.0.0 |
| Ethernet > DNS > S | - | IP address (Secondary DNS sever) | 0.0.0.0 |
| Ethernet > DNS > Suffix_P | - | Primary domain suffix | Blank |
| Ethernet > DNS > Suffix_S | - | Secondary domain suffix | Blank |
| Ethernet > Login > Login | - | Use/Not | Not |
| Ethernet > LoginSet > Level | - | Admin/User1 to User6 | Admin |
| Ethernet > LoginSet > Register | - | On/Off | Admin and User1 are On |
| Ethernet > LoginSet > User | - | 16 characters or less | Admin: admin<br>User1 to 6: user1 to user6 |
| Ethernet > LoginSet > Password | - | 4 characters or less | Administrator: 0<br>User1 to 6: 1 to 6 |
| Ethernet > Timeout > Timeout | - | On/Off | Off |
| Ethernet > Timeout > Duration | - | 1 to 120 min | 1 min |
| Ethernet > K. Alive > Keep alive | - | On/Off | On |
| Calibration (/CC1 option) | | | |
| Calibration > Channel | - | 01 to 24 | 01 |
| Calibration > Mode | - | Revise Value, Absolute Value | Revise Value |
| Calibration > Point | - | 2 to 16 | 2 |
| Cust. menu > Cust. menu | - | Not/Use | Not |
| Cust. menu > Password | - | Numbers and spaces within 4 digits | Blank |
| Cust. menu > P_Adj | - | On/Off | Off |
| Select menu > Set mode > Range | - | On/Off | On |
| Select menu > Set mode > Bias | - | On/Off | On |
| Select menu > Set mode > Alarm | - | On/Off | On |
| Select menu > Set mode > Unit | - | On/Off | On |
| Select menu > Set mode > Chart speed | - | On/Off | On |
| Select menu > Set mode > Aux | - | On/Off | On |
| Select menu > Set mode > Calibration | - | On/Off | On |
| Select menu > Set mode > Math | - | On/Off | On |
| Select menu > Set mode > Batch name | - | On/Off | On |
| Select menu > Set mode > Batch detail | - | On/Off | On |
| Select menu > Function > Manual print | - | On/Off | On |
| Select menu > Function > Setup list | - | On/Off | On |
| Select menu > Function > Message | - | On/Off | On |
| Select menu > Function > Buffer clear | - | On/Off | On |
| Select menu > Function > Periodic | - | On/Off | On |
| Batch (/BT1 option) | | | |
| Batch > Batch | - | Not/Use | Not |
| Batch > Lot No. | - | 4/6/Not | 4 |
| Batch > Dual comment | - | Not/Use | Not |
| Batch > MSG format | - | Not/Use | Not |
| Adjustment | | | |
| P_Adj > P_Adj | Dot Model | Hysteresis/Zero/Full | Hysteresis |
| | Pen Model | Zero/Full | Zero |
| P_Adj > Pen No. | Pen Model | 1/2/3/4 | 1 |
| Store | | | |
| End > End | - | Store/Abort | Store |

# Recommended Replacement Periods for Worn Parts

To preserve the reliability of the recorder and to use the recorder in good condition for an extended time, it is recommended that periodic replacements be made on parts. The replacement parts may change to accommodate preventive maintenance over extended time. Be sure to check with your nearest YOKOGAWA dealer.
The table below shows the recommended replacement period for expendable parts. The replacement period shown here applies when the recorder is used under standard operating conditions. For the actual replacement period, consider the actual conditions of use.
Replacement of parts other than the chart paper, pen, ribbon cassette, and internal light LED will be carried out by a YOKOGAWA engineer or an engineer certified by YOKOGAWA. Contact your nearest YOKOGAWA dealer when such replacement is necessary.

***Note***

The replacement period of the display and the internal light LED is the half life of the brightness. The deterioration of brightness varies depending on the condition of use, and its determination is subjective. Consider these facts for determining the actual replacement period.

## Pen Model

| Item | Replacement Period | Part Name | Part No. | Note | Quantity Used |
|---|---|---|---|---|---|
| Z-fold chart paper | 41 days<br>33 days | CHART | B9573AN | When used at 20 mm/h<br>When used at 25 mm/h | 1 |
| Felt pen | 2 km | PEN ASSY | B9902AM<br>B9902AN<br>B9902AP<br>B9902AQ | Red<br>Green<br>Blue<br>Violet<br>At a pen speed of 10 cm/s | 1 each |
| Plotter pen | 100,000 characters | PEN ASSY | B9902AR | When printing continuously | 1 |
| Display | 5 years* | DISPLAY ASSY | B8802CA | | 1 |
| Chart paper feed motor | 5 years | MOTOR ASSY | B9905GS | | 1 |
| Plotter carriage | 5 years | CARRIAGE ASSY | B9905NB | | 1 |
| Plotter motor | 5 years | MOTOR ASSY | B9905NS | For the X-axis | 1 |
| Lever | 5 years | Lever ASSY | B9900RH | For the plotter | 1 |
| Pen servo | 5 years | SERVO ASSY | B8802KE | Shared by all pens (excludes the pen arm ASSY) | 1 to 4 |
| Internal light LED | 2 years* | LED ASSY | B8800CR | | 2 |

* The half life of the brightness at the factory default brightness setting.

## Dot Model

| Item | Replacement Period | Part Name | Part No. | Note | Quantity Used |
|---|---|---|---|---|---|
| Z-fold chart paper | 41 days<br>33 days | CHART | B9573AN | When used at 20 mm/h<br>When used at 25 mm/h | 1 |
| Ribbon cassette | 3 months | RIBBON CASSETTE | B9906JA | | 1 |
| Display | 5 years* | DISPLAY ASSY | B8802CA | | 1 |
| Chart paper feed motor | 5 years | MOTOR ASSY | B9905GS | | 1 |
| Pulley | 3 years | PULLY | B9901EY | For the carriage | 2 |
| Carriage motor | 5 years | MOTOR ASSY | B9906FX | | 1 |
| Carriage | 5 years | CARRIAGE ASSY | B8803BB | | 1 |
| Ribbon shift motor | 5 years | MOTOR ASSY | B9906FS | | 1 |
| Ribbon shift gear | 5 years | RIBBON SWING GEAR ASSY | B8803BS | | 1 |
| Ribbon feed motor | 5 years | MOTOR ASSY | B9906GL | | 1 |
| Ribbon feed gear | 5 years | GEAR | B9906GN<br>B9901HM<br>B9901HN | | 1 each |
| Internal light LED | 2 years* | LED ASSY | B8800CR | | 2 |

* The half life of the brightness at the factory default brightness setting.